

AVIATION WEEK

A McGRAW-HILL PUBLICATION

JULY 13, 1953

50 CENTS

Gun platform?

SURE. That's all a fighter plane is—a gun platform. But up here you forget. Up at thirty thousand feet, the sun is white on anvil wisps of thunderheads. You move the stick over. The horizon rolls and you look up at the sea.

To the engineers, she's the Cougar—complex requirements solved by design. She is so many pounds of thrust and weight, lift and drag. She is thousands of parts and hours of work by hundreds of men and machines, hours of inventiveness and investigation. To some, she is requests to do more, carry more, fly faster, which somehow she does.

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NEWS DIGEST

Domestic

Bell X-1A nose skirts fail enough for four and a half minutes of wide-open operation, nearly twice that of the X-1. Mr. Charles E. Yeager told an ASME meeting in Los Angeles last week. Yeager, first man to break the sound barrier, tested X-1A, which exceed X-1's Mach 1.5 performance.

C-124 Globemaster will undergo five modifications in production, following a study headed by Major Gen. Vernon E. Brinkmann, USAF Deputy Inspector General, of crash that killed 229 in Japan June 18. Investigation disclosed crash followed failure of generator drive-shaft of left outboard engine last May, p. 22. Modifications are: separation of fuel pump and generator vent lines; shunting of generators and alternators from fuel splitters; blank holes for additional generator cooling; reduced tightening of mounting bolts that connect generator to engine; cockpit addition to show generator overheating.

USAF Gen. Louis Naudet is new Air Deputy to the Supreme Commander of Supreme Headquarters Allied Powers Europe. He will assume centralized control of western air craft. Naudet's post, Central European Air Commander, will be taken over to the accompanied SHAEF command situation by Air Chief Marshal Sir Bertil Embrey of Britain.

All-allowance simulator for B-52 jet bombers will be designed and built at Central Wright Camp 1 Electronic Div at Cuyahoga, N. J., under a contract awarded by USAF. Lt. Col. T. H. Haskins, operations director and president, received last week.

"Black Friday" was staged by more than 170 Trans World Airlines maintenance crews handles by 1,000 company employees for MATS flights on the Pacific which has been around despite conflicts in the California labor strike zone. The apartment center of TWA's corporate headquarters closed last week.

On the Classroom Award for 1953 will be presented by TAC this week to W. H. Liss, B. Argusson, Douglas Aircraft engineering test pilot, for "outstanding contributions to the knowledge of supersonic." Thomas H. Stear Award



YB-52 Passes Year of Tests

Rightmost Boeing YB-52 Stratofortress, with more than a year of flight testing on its log books for patches over the Pacific Northwest. The big bomber's Pratt & Whitney Axialflow J75 engine, in the 16,000-lb. thrust class, is fitted with four JPs.

will be given to Beaupre F. Gossen, Jr., AMRC Cambridge Research Center, for the development of an electronic system for airport traffic control.

Fleet B-36 piloted by USAF crews landed last week at MATS Dover, Del., base, the first group of approximately 100 Superfortresses that Britain is returning to USAF. The bombers were loaned to RAF three years ago under the Mutual Defense Assistance Program.

Fleet F3D Skynights and AD-4 Skyraiders produced for Navy by Douglas Aircraft Corp. have rolled off the assembly lines at El Segundo (Calif.) Div., marking way for delivery of new 1-4Ds, AD-5s, and fit.

Flying Tiger Lines' \$15-million round-trip contract for MATS flights on the Pacific which has been around despite conflicts in the California labor strike zone. The apartment center of TWA's corporate headquarters closed last week.

An transport contract has been awarded Transocean Air Lines, Inc., American President Lines to its 246 aircraft stations to U.S. cities in the Far East during July and August and return all aircraft from Takao to Okinawa, Calif.

Lightplane components by seven U.S. companies last month placed by 303 one- to 10-place utility and execu-

tive aircraft one of the four transports yet developed, Boeing engineers report, pending to the powerplant's spark rate of acceleration. Boeing's new 707 jet transport will be fitted with four JPs.

two aircraft with a total value of \$3,535,000. Aircraft Industries Corp. reports Companies included in the is: Aircat, Aeroplane, Beech, Caliber, Convair, Macneil, Piper and Tepaircraft.

Financial

Southeastern Airways' reports a net profit of \$66,711 for 1952 from an airline with gross operating revenues of \$7,165,669.

Western Air Lines has declared its third 1953 dividend, 15 cents per share payable Aug. 13.

International

Supernumerary Seats, British jet fighter, not an official London Press sports star, died last week. Flying the 216-lb. aircraft in 19 min. 38 sec. at an average speed of 666.8 mph. The new mark clipped 1 min. 19 sec. and the previous record set four years ago.

Panavia Helicopter Corp., Morton Park, has formed a wholly owned Canadian subsidiary, Panavia Helicopters Co. of Canada, Ltd.

Curtiss-Wright Corp., Wood-Ridge, N. J., has formed a wholly owned subsidiary, in Amsterdam, Holland, to do sales and service of the company's products in Europe. The new division, the firm's tenth, is called Curtiss-Wright Europe, N. V.

WYMAN-GORDON
FORGINGS OF ALUMINUM • MAGNESIUM • STEEL
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HARVEY, ILLINOIS DETROIT, MICHIGAN



How Stewart-Warner makes ONE TAPE do the WORK OF TWO



1. A pending test South Wind tester for the Army is sealed with waterproof Polyken Tape No. 213.



2. The exterior is then bagged in an airtight finished pack from which the air is removed. This bag is placed in a tightly baled carton.



3. The outer carton is sealed like the inner one with Polyken Tape No. 213.



4. Spare parts get the same government-approved treatment.

Polyken Industrial Tape Cuts Costs and Improves Spart Spec. Packaging of South Wind Testers

Stewart Warner Corp. formerly used two different tapes to seal outer and inner cartons containing South Wind instruments and accurate barometers for military and civilian use.

Then they switched to waterproof Polyken Tape No. 213 for both jobs. A follow-up check by packaging engineers revealed that the cartons were being sealed more securely, packaging costs had been reduced and the possibility of workers using the wrong tape had been eliminated.

Polyken No. 213, ideally suited for this Stewart Warner job, is removable, waterproof, and conforms to Government Specification JAN-P-125, Type 1 Grade B.

More than 100 other Polyken pressure-sensitive tapes are at your service, all removable in just one minute, many seal effecit. Send in coupon for free tape samples and booklet.

WHO'S WHERE

In the Front Office

J. Charles Wright, Jr., former president of Lockheed Engine & Airplane Corp., and one of the principal founders of Lockheed & Wright Aircraft Div., Douglas Aircraft Corp., has been elected president of Vitex Corp. of America, New York.

Mike Goss, Frank A. Heidmann (USA Ret.) former Army Chief of Testers, has been named to the board of directors of Halcro-Holmes, Palo Alto, Calif.

Stanley Gotschi is now assistant to the president of Air Transport Assn. Witching, Mass. D. G.

Capt. G. H. Schleicher (USN Ret.) has been appointed assistant to the president of the Carter Leverett Corp., Washington, D. C.

Changes

John Hodges has been named assistant to the vice president flight operations of United Air Lines.

Bob G. Clemons, a new head of guided weapons development at Fairey Aviation Co.'s Research and Assessment Department, Farnborough, London.

James R. Whigham, formerly in development solid propellants for rockets and guided missiles, has been appointed assistant plant manager of the Research Institute's department of chemistry and thermal engineering, San Antonio, Tex.

Charles E. Turner has been promoted to chief pilot, Farnborough Testers Air Lines.

Anthony Eustachio has joined Longview Corp., Longview, Calif., as general manager.

Frederick C. Hall is now district operations manager for Capital Airlines at Rochester, N. Y.

Walter M. Coonan has been appointed sales and marketing manager of Reflet Aircraft Co., Inc., New York, N. Y.

Les S. Gotschi has been named senior design director of United Aircraft Products Division.

Stanley G. Holloman has been promoted to assistant director of contract administration for North American Aviation, Los Angeles.

Donald H. Bassett is now coordinator of contract operations of Flying Tiger Line in the Pacific西北, succeeding A. E. James, who is retiring.

George M. Coonan, jet propulsion and dynamics authority and Prof. Seymour M. Bogardus, design and operations specialist at Johnson andogenesis research appears not have been appointed to the permanent faculty of Princeton University's department of aeronautics engineering.

Honors and Elections

Gen. E. R. Quisenberry (USAF Ret.), vice president of Gilm Industries, has been named to the executive committee of the Flight Safety Foundation.

INDUSTRY OBSERVER

► Watch for an increasing number of aircraft and engine quota contracts to be placed in Europe by U. S. firms for the support of NATO air craft. In addition to the large Republic and Alenia orders already placed in France and Italy for F-104 support, Wright is expected to order Sopwith's 105 (105) quota from Armstrong-Whitworth Motors for the F-104F program.

► Belford has sold 85 of its presses to England to date with all but one absorbed by the British aircraft industry. Belford presses sold should range from a 17-tonner, being built at England under license, to a 165-tonner being used at Vickers-Armstrong's Weybridge plant for production of the Valiant four-jet bombers.

► Production models of the Gloster Filton delta wing, all-weather fighter will have increased wing span. Leading edge of the delta has been extended 10% to 15% toward the wingtip.

► Watch for Short Brothers to test a long-range patrol bomber incorporating heavier layer control devices. The firm's chief designer, David Kirk Lewis, recently gave testimony the following day on the Short S.6 in a recent lecture. "The thicker sections possible with boundary-layer suction make the idea more practical and if becomes very attractive for longrange, low-speed aircraft which require endurance as opposed to range, for example, Coastal Command aircraft engaged in anti-submarine."

► Some observers see a recent event in Britain as an example of how that a design U. S. off-the-shelf plane buying can be for short. The first of 107 Hawker Sea Hawk jet fighters bought by the U. S. for \$13 million under the off-the-shelf program were delivered by Armstrong-Whitworth, the manufacturer, to the U. S. Navy at a Coventry ceremony. In the meantime the U. S. Navy then handed the aircraft to the British Navy. It is expected that some Hawker Hunters being bought by the U. S. under off-the-shelf procurement will similarly find their way to the Royal Air Force.

► Bradley Page is promoting its ILP-E. 5 design for a DC-3 turboprop replacement but so far has had no takers. No decision has been made to build a prototype.

► Rolls Royce R.A. 7 Avon, which powers the Swift and Hunter fighters, has passed a type test at 30,000 lb thrust without afterburning. The afterburning R.A. 7, rating 7,000 lb dry and 9,000 lb with afterburning.

► Hawker Aircraft has scrapped plans for a delta-wing fighter and will continue to develop the basic Hunter design with more emphasis and less power as previously reported in Aviation Week.

► Curtis-Wright Corp. has formed a special team of experts to special production of the 105 Sopwith helicopter. Team members are transferred by special overland flights and have the power to move through the Wright shop taking priority on machines and tools for JET production from other production items.

► Sosac, French licensee of Sikorsky on the S-55 10-passenger helicopter, has issued its product the Englebert Joyeux. Two members are scheduled by special overland flights and have the power to move through the Wright shop taking priority on machines and tools for JET production from other production items.

► Latest interest in the de Havilland D.H. 113, twin-turboprop-powered, two-blade figure-eight started at the 1952 SBAC Farnborough show series from the British Navy. Second D.H. 113 prototype is now being built by the Ministry of Supply as a high-speed search aircraft.

► CAA has developed a fire-resistant paint to protect aircraft oil tanks. First application have been made on several Concorde and USAF F-86 Sabre fighters.

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Evolution of USAF's Fiscal 1954 Budget

The following table outlines the 10 steps in development of Air Force's fiscal 1954 budget from the first USAF request for \$12.3 billion to \$11 billion recommended by the House of Representatives.

The first seven columns contemplate a 139-wing Air Force by mid-1954, and of the new fiscal year. They disclose that estimates to achieve the goal varied from USAF's first recommendation to the revised \$11.2 billion.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Original Defense	USAF Dept.	revised Dept.	Budget	Bureau	Wilson	Vandenberg	Bureau	House	House
request	staff	revised	request						
months	months	months	months	months	months	months	months	months	months
time	months	months	time	months	time	months	months	months	months
Selected Dates	(Fall 1952)	then	(Fall 1952)						
Allotments and related programs	\$2.0	\$6.0	\$11.2	\$6.9	\$6.3	\$11.5	\$11.5	\$11.5	\$11.5
Base construction	5.9	9.7	4.6	10	7.9	5.6	5.6	5.6	5.6
Operations	4.6	5.9	4.6	4.2	4.2	4.2	3.3	3.3	3.9
Research and development	5.6	4.6	4.6	3.5	5.2	3.4	3.4	3.2	4.4
Total budget (\$)	\$11.2	\$11.6	\$11.6	\$17.5	\$15.2	\$16.8	\$15.5	\$11.7	\$11.2

(1) This is the original date.

(2) Total is the date of earliest base, major personnel other than staff, military personnel implement procurement requirement. An "X" means staff requirement.

(3) Estimate of excess for base construction.

AF Budget Nears Showdown in Congress

- Senate Military Appropriations Subcommittee recalls Vandenberg, Wilson for final testimony on cuts.
- House debate centers on Eisenhower's support of the reduced funds and Twining's stand in the fight.

By Katherine Johnson

More odds were stacked against Air Force's budget fight in December USAF's fiscal 1954 funds in Congress, as it prepared to consider the Senate version, as the defense budget has the same fate that opened July 1.

Their next big development:

• President Eisenhower planned a letter stating that the proposed budget "impairs my own views and basic air personnel requirements in all particular."

• Gen. Hoyt S. Vandenberg, recently retired USAF Chief of Staff, and Defense Secretary Charles E. Wilson, the two key contenders in the USAF budget fight, were asked by chairman, Hearings to make a final appearance before the Senate Military Appropriations Subcommittee.

In testimony before the subcommittee last week, Vandenberg backed

an attack on Wilson's \$11-billion budget of the \$16.8-billion AF budget submitted by former President Truman. In a letter to the Senate, he argued that \$4 billion should be removed to reduce the AF budget to 145 wings—already disrupted, he said, by Wilson's revisions.

The report for reappropriation of Wilson and Vandenberg was made by Sen. John McClellan, wincing in his support for a bigger USAF budget, who had to wait another 40 days to "decide" amid by conflicting Vandenberg and Wilson testimony.

The vote was split down party lines. Only five Republicans supported a higher USAF budget. Sen. Styles Bridges and Charles Mathews (both Air Force officers during World War II), Carl Hatch, Walter Judd and Ruth Noelle Rogers, three Southern Democrats, mostly from the South, joined 10 Republicans in opposing it.

The USAF defeat was compounded when the House later voted consistently to reduce the \$11-billion

budget recommended by its appropriations committee. This was \$1.2 billion lower than Wilson's recommendation.

No effort was made to reflect this cut when \$16.8 million from maintenance and operations, \$15 million from research and development, \$33 million from military personnel, and \$25 million from procurement other than aircraft were cut.

Rep. Jacob Javits, urging the House to drop down the line with President Eisenhower's recommendations, defense money, threatened an attempt to have the research and development cut restored after the House had cut amendment to separate smaller Army funds clinched by the committee.

► **Price Fight**—Meanwhile, House Select Committee on the Air Force, Sen. Strom Thurmond, took the Senate floor for a point-by-point defense of the USAF against an attack by the House Appropriations Committee Chairman, John Teller, Senior of the subcommittee.

Vandenberg has taken a "no-deviations" stand.

Wilson's defense of it, when asked of his objection, Wilson is up against from Vandenberg and the rest that is trying to cover up their own mistakes by making false statements about what the situation is."

Stromberg: "A great officer graduate from West Point. He serves his country for over 30 years. He becomes the head of Com. Eisenhower's Tactical Air Force in Europe. He is highly decorated for personal gallantry in action. His record, as he now leaves his country's service, is to be accused of making false statements of being a 'robot' against his country's interests."

Teller: "The only planes removed from the program to be constructed for were transport and pilot planes that were not used for training."

Stromberg: "Two hundred 24-7 bombers of the current type were eliminated. In addition, assault transports (his wing) are consistently downsized by the Defense Department in non-combat aircraft."

"The attack to classify assault transports as assault planes would be bitterly resented by those practitioners who jumped over Normandy and Aden and shot down the planes who flew those planes."

Stromberg said Teller was given "misinformation" by the Assistant Secretary of Defense (Comptroller), W. J. McNeil. The former AF Secretary stated:

"Much, if not most, of the information about assault planes would be bitterly resented by those practitioners who jumped over Normandy and Aden and shot down the planes who flew those planes."

"The Comptroller's Office told me that evidence of waste would be used against the Air Force if this reduction was restored in the Congress at any time.

"These officials, among others, feel expansion in the current effort to get Congress to spend suspended dollars in Air Force appropriations. Actually, the major portion of the Air Force reflects a simple application of resources to expand its flying operations, rather than the present overstatement of Air Force expansion that can be eliminated. Through better programming and organization, we will return more closely to power more swiftly than would otherwise have been likely at this time."

► **House Debate**—There were two points which arose again in the House debate on USAF's budget.

• In the President's favor of the stand

Leaders of the fight for USAF stand

led by their contention that "the money man" made up the defense budget and that the President simply "wrote it up" with it, even in the face of a strongly worded letter from House to Rep. Bert Stoen, Stoen, who argued that the budget represents his own

"The more I hear, the more I am against Vandenberg and the rest that is trying to cover up their own mistakes by making false statements about what the situation is."

"In addition, and during the most three-month period in which the budget was evolved under the sign of the budget, I met frequently with the Secretary of Defense and his deputy, discussing in detail fundamental defense problems, including budgetary norms and force goals."

The President, for the first time, spoke of reducing the USAF budget, clearly indicating his intent to do so.

"There is... the ever-present thought, with which all of us are familiar,

of service purposes for a larger proportion of the defense dollars—an issue that is never resolved to the full satisfaction of any service.

"These officials, among others, feel expansion in the current effort to get Congress to spend suspended dollars in Air Force appropriations. Actually, the major portion of the Air Force reflects a simple application of resources to expand its flying operations, rather than the present overstatement of Air Force expansion that can be eliminated. Through better programming and organization, we will return more closely to power more swiftly than would otherwise have been likely at this time."

► **Senate Twining**—In favor of the Wilson

► **The opposition to the USAF stand claimed Twining was on their side. They supported their case by pointing to the president's testimony before the Senate Armed Services Committee when he opposed the committee's 147 wings USAF "survivors" and he left the USAF "survivors" and he left the USAF Department would delay the building of 145 wings."**

► **Rep. Wilson's impasse**, claiming Twining for their side, reiterated his later testimony: "What the force should be, I could not say. Maybe it is more than 145 wings and maybe it is less. But I do feel it is time to take a good look at it."

► **Should Congress make money available in the Administration's budget to accomplish its 145-wing buildup if that is the force the president wants?**

The 145 wings supporters argued that the should be done. They pointed out that Congress will not be in session



PRODUCTION STAFFERS PACK DOUBLE WALLETS

Now Lockheed F-104 Starfighters will be flying in a ring around the fuselage nose, just behind the pointed nose. The star-shaped pipe-like gear pivots upward behind the fuselage to assist in making use of the fighter's F-104's 100 during ground tests.

and, if the new JCS confirms the 145-
seat limit, the money should be
on hand to more closely watch it
promptly.

Rep. Paul Laxalt commented: "Let
us make the funds available, and if
they do not want to use them, they
do not have to. But if they do not use
them and disaster comes it will be their
problem. It is all who brought it about."

But the opposition argued that this
isn't necessary since the defense budget
is extremely low, the law which re-
quires departments and agencies to
submit funds for a full year's operation.

In other words, the President could
point Defense Department to go full
years on spending and obligating this
fall and request a deficiency appropria-
tion next January for the remainder of
the year.

* **It's easier to insist being substituted
for USAF in the strategic role.**

Ponting said that Wilson's program
cuts out the Strategic Air Command
stage but allows continuation of
the first, combat-deterrent, stage. Rep. Terry
moved to insist that it is when the
air armament is to replace the Strategic
Air Command.

But there was no fight to kill funds
for the second, and Terry pointed out
that he supported continuation of the
second earlier last year—indicating that
USAF proponents do not now want to
upset warfare as the Navy.

"They commented: 'If the Air Force
is going to have to compete for the
same reduced funds, you are going to
have to set up some priorities and eval-
uate the Strategic arm and carry that
forward against the Air Force strategic
stage and the other wings which you
are leaving.' I don't think that has
been done."

Detroit Labor Battles Pentagon on Kaiser

Kaiser-Mason Corp. and Chase Aircraft
Co. officials settled with at the
end of last week of the outcome of Air
Force Secretary Elwood Tolson's confer-
ence with Michigan congressional and
union leaders of the Detroit area.

Tolson set the second Detroit con-
ference at the insistence of Detroit
residents. They represent the 30,000
union members at Kaiser's Willow
Run, Mich., plant who had tried to
test because of Air Force's cancellation of
Kaiser's C-119 contract. Union officials
strongly defended the production re-
quest of workers in the Detroit automo-
tive industry.

While newspaper reporters kept
assaulting their Washington congressional
deals for threats to keep the Kaiser
plant hot in Michigan, Air Force
spokesmen maintained the cat had been
made and it would probably stay hot

—Here is where the two affected union
factions stood last week:

* Kaiser engineers planning C-119 produc-
tion of 37 planes which it is
supposed to finish within three months.
Nearly 6,000 employees have been
laid off at the plant. Elmer F. McClellan, vice
president, says management has

politicized the plant to oppose the

McDonnell C-119 Demolition fighters.

Detroit built its growth primarily on
subcontracting for major peace military
aircraft construction and overhauled
and modification work, although it has also
manufactured the two-place Swift light-
plane, a design taken over from Globe
Aircraft, and several years back de-
signed the T-33 Sabreliner jet
in original manner, a small number
of which have been sold.

There is still the Detroit Light-
plane division, McClellan writes.
The plant will make subcontractors, total-
ing about 35% of the complete jet
airframe, as contract from McDonnell Air
Force. But Air Force has not issued C-119
contracts.

* Chase Aircraft is at a standstill on
C-119 production since Air Force pre-
ferred that. Army still wants the C-119 pro-
duced but Air Force has not issued C-119
contracts.

Elmer F. McClellan, McClellan's
vice president, says the Detroit plant
will remain at Detroit and 500
men at Grand Rapids, Tex., in Dec. 31. Ap-
proximately 1,000 workers were laid off
as the two plants became of the F3H
plane contract termination.

New ARDC Chief:

Putt, McCormack

Gen. Gen. Donald L. Putt succeeds
Gen. Earle E. Partridge as Com-
mander of the Air Research and Devel-
opment Command, U.S. Air Force
Ft. Rae, Calif. Vice Commander of
ARDC is Lt. Gen. Fernando L. Bassett, former
Deputy Chief of Staff for Operations at
USAF Headquarters.

Commander is a second lieutenant
in the Signal Reserve in 1938. Putt has
17 years experience as various air re-
search and development assignments.
He is a 1938 graduate of George
Washington University's Dept. of Technol-
ogy of new degree in electrical engineer-
ing. He holds a master's degree in
aeronautical engineering from
Clemson Institute of Technology.

He served with the Air Force in
Europe during World War II, returning
in 1946 as Assistant Chief of Staff for
Intelligence at Air Materiel Command
Wright-Patterson Field. In December
1946 he became Deputy Chief of the
Engineering Division at Wright-Patterson.

Putt has also served as Director of
Research and Development in the Office
of the Deputy Chief of Staff for Materiel
and as Assistant Deputy Chief of
Staff for Development.

Major Gen. James McCormack, Jr.,
successor Putt as ARDC Vice Com-
mander. Much of McCormack's recent
experience has been in military applica-
tions of atomic energy.

The Air Force and Navy. The com-
pany began plans to prove that the cost
per performance and life of its jet sub-
contracted out was equal. Testing
will also start later this month and will
be completed in September, McClellan says.

The plant will follow closely aero-
nomic trials to produce the McDonnell

C-119 Demolition fighters.

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subcontracting for major peace military
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tions of atomic energy.

Training's 1954 Forecast:

Trained Pilot Shortage to Hit AF

New Air Force Chief says airmen are highly trained
but underpaid technicians who hold edge on Reds.

Starting aeronautics as today's most
expensive, yet most profitably trained
to overshadow the studies being made by
U.S. airmen, Gen. Nelson E. Twining,
Air Force Chief of Staff, said last week.

In his first major speech since he
became Chief of Staff, Twining told
Massachusetts' American Legion con-
vention at Stow not to forget "the men
men who have been born."

Twining told the airmen: "Unlike the
experts, we focus on sterling character
as a desire to live up to our responsibilities
and to serve the greatest good," he said.
"But we are willing to live up to our
responsibilities in the face of the
whole spectrum of our enemies to get
back to Machuca will suffice to them
struggles."

The Air Force Chief insisted that
F-86 pilots down there 74 Command
MiGs without a single loss in air to
enemies but insisted, "an experienced
pilot who may never be repeated,"
Everyone agrees that the superiority of
the Air Force must make it possible,
he said.

► **Independence**—In order to compete
with the Red method of training the
most pilots the cheapest way possible,
we must be willing to pay in men
and money, not in millions of dollars
but in thousands of hours. Twining
pointed up the exposed character
of adequately trained airmen. Twining
predicted that "next year we will begin
long large numbers of veterans serving
at least two or three years service,
most of them with good backgrounds
in technical training experience who

will be assigned to the Air Force in
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The first stage of these planes were advanced
in the advanced stages of their training," the general said.

"World War III is fixed upon us,
our huge effort of overall victory will be
just as dependent upon the skill and
tacticals of our crews as upon the per-
fection of our equipment."

Jet Target Test

Twining reported that British-designed
Javelin radar-controlled jet target plane
taking off like rocket and landing like
flying leaf at the Long Range Weapons
Establishment, Wroughton, Avonshire, Great Britain
is 21 ft. long and weighs 18,000 lb.
Powered by a 1,600-hp Bristol Aeroplane
Spartan Viper. Like MiG-2, of which more
than 50 have been built, will be powered
by 1,600-hp sleeve Viper. The craft takes
off from a mobile dolly having a ground-
based launcher. When craft impact
velocity reaches a preset speed, its electrical
circuit closes, applying control signals
and the craft takes off. Rollers on mobile
launcher are automatically applied to the
craft's rear wheels. A small amount of fuel is injected
automatically on takeoff, which is approxi-
mately one and a half seconds. On landing,
retractable skids are lowered by links.

begin four-year enrollment shortly
after the beginning of the Korean war.

He added that the most highly
trained and highly skilled men have
the lowest enrollment rate of all.
This is caused, he said, because of the
institute with housing and living
conditions in some places not made
quite what would be desired by
other young people.

"Men," he said, "are the pre-
minent rate for our most highly skilled
people drops to as low as 15% and the
Air Force has to find new men by the
thousands each month and start the
whole expensive process over again."

"They are rotting green pilots
who have the Yaks training grounds so
upside down that they cannot satisfy
their best men experienced pilots," he said.
"But they are willing to live up to our
responsibilities in the face of the
whole spectrum of our enemies to get
back to Machuca will suffice to them
struggles."

The Air Force Chief insisted that
F-86 pilots down there 74 Command
MiGs without a single loss in air to
enemies but insisted, "an experienced
pilot who may never be repeated,"
Everyone agrees that the superiority of
the Air Force must make it possible,
he said.

► **Independence**—In order to compete
with the Red method of training the
most pilots the cheapest way possible,
we must be willing to pay in men
and money, not in millions of dollars
but in thousands of hours. Twining
pointed up the exposed character
of adequately trained airmen. Twining
predicted that "next year we will begin
long large numbers of veterans serving
at least two or three years service,
most of them with good backgrounds
in technical training experience who

will be assigned to the Air Force in
the advanced stages of their training.
The first stage of these planes were advanced
in the advanced stages of their training," the general said.

"World War III is fixed upon us,
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fection of our equipment."

Latest Allied Jets Vie at Paris Air Show

By Ross Hartstein
PHOTOS-11th World News

Paris-France staged her biennial international air show at Le Bourget Airfield in the accompaniment of a series of some "bangs" as jets broke through the sound barrier for the first time before the French public.

The show was a great success. Record crowds thronged the big glass-walled exhibition hall, shielded among the parked aircraft, jet outside, and caused ranks to draw to see each pilot put their planes through their paces during the June 25 July 5 display.

Helicopters whirled busily back and forth carrying passengers from the edge of Paris to the various air groups. There were exhibitions by French, U.S. and British air forces, including a low-level flight of 200 NATO planes and a mass drop of French navy parachutists.

► **New-Nation Exhibit**—This year approximately 250 exhibitors from nine nations—France, Britain, the United States, Sweden, Italy, Belgium, The Netherlands, Luxembourg and Spain—displayed equipment and planes ranging from rather big jets in a dark sea de Havilland Comet 4 recently bought by the French airline, Union Aeronautique de Transport.

A Royal Canadian Air Force F-86 Sabre was the first plane to break the sound barrier. The French jet fighter Dassault's Mystere 4 piloted by Col. Georges Remond and the S.O. 4753 Vautour built by Societe Nationale de Construction Aeronautique du Sud-Ouest and piloted by Jacques Gauvin and two British planes, the Hawker Hunter with Neville Duke at the controls and the new Vickers Supermarine Swift 6 flown by Michael Lithgow also performed the last.

The French government has just placed an order for a pre-production batch of the S.O. 4750 comprising two jet fighters/attackers covering several versions of the plane.

► **Socata's Trident**—Fastest plane in the show was S.O. 900 Trident which is expected to reach Mach 1.6. The Trident is powered by two Turbomeca Marboré jets of 550 lb. thrust each and carries six rockets to push it through the sound wall. It made its first flight May 3 and has not yet been tested with rocket power. The plane flew at Paris with only the jets operating.

The Trident and the S.O. 900 Bi-couleur built by Societe Nationale de Construction Aeronautique du Sud Est illustrate the efforts of French builders to develop lighter, cheaper, longer-range aircraft operating from



Socata S.E. 210 Caravelle transport model



Dassault Mystere 4 fighter



Socata S.O. 4750 Vautour fighter-bomber



Socata S.O. 1120 Avant jet fighter



Fouga Magister 1MK 61 trainer



Socata S.E. 2110 Aviojet transport



Socata S.O. 1220 Djinn jet engine



Mitsubishi M.H. 1521 transport

less expensive wings than those required for today's standard fighters.

So far, France has not built the Trident for either earthbound and one-fourth the cost of an F-100 Super Sabre. The Trident is a fine fighter plane with much shorter range, but in certain believe it will prove to be well suited to French requirements. They say France is, after all, only 15 minutes flying time from the Iron Curtain and would be better served by a large number of short-range but fast interceptors operating from relatively inexpensive landing strips than long-range fighter aircraft.

► **Socata's Baracuda-Sparrow**—Answer to this problem is the S.O. 3000 Beaudouin. This plane has not yet flown and was presented at the show only as a model. The Baracuda is capable of taking off from almost any field and it lands on skids in a very short distance.

Takes off is made from a tubular steel dolly equipped with six rockets which fire the plane into the air. The plane is pulled onto the carriage by a grip, its landing skids retracting automatically in the process.

The Baracuda is powered by a Socata Ann 102G engine of 6,150 lb. thrust. The wingspan is 32 ft. 8 in. and the plane is sharply swept. Length is 64 ft. The plane weighs a little less than five metric tons. It is armored and designed principally for ground support. Since it can't fly it will be able to operate from fields about 700 yds. long.

Other French combat planes presented were the Socata Magister, a slightly modified French version of the British DH Vampire, and the Sea Vixen, which Socata she is building under DH license. The S.E. 2110 Goliath, a big heavy attack plane powered by two Hispano-Suiza 12N24s, was displayed as part of the Goliath line. Development of the Goliath has been stopped, but the plane is now used to test jet equipment.

In addition to the F-86, the Hunter and the Swift, the foreign military planes in the show included the U.S. Republic F-84G and Douglas A-1E, the British English Electric Canberra jet bomber, Sweden's jet-powered Saab 90, Richard's Folland G.14 at present and Italy's Marzocchi 531 bomber.

► **New Jet Trainer**—The light French jet trainer, the Fouga 175K Magister and the Morane 735 Pfeil, also impressed spectators. Military aircraft from the U.S., Britain and especially France's European neighbors are studying both these planes. The French Air Ministry is testing them, with an eye to ordering one into production.

The Magister is a tandem monoplane powered by two Turbomeca Marboré jet engines of 850 lb. thrust. It is equipped with a pressurized cabin and

airutable landing gear. The plane cruises at 400 mph. Span is 37 ft, length 32 ft and total weight 3,460 lb.

The Matra P.1000 first flew Jan. 23. It seats two side-by-side, has a pressurized cabin, retractable landing gear and sits in front of two Turbomeca Marboré engines. Cruising speed is 403 mph., range 31 ft, length 32 ft and total weight 4,569 lb.

In a demonstration before the Aeronautics industry meeting in May the Matra 755 landed from a test flight, was rapidly disassembled, then reassembled and back in the air within thirty minutes. In summary, the engine, fuel tank, canopy, seats, and some special equipment were removed and replaced. **Jet Transport**—One of the transports on exhibition was undoubtedly GAF's new Canadair 1A. The French industry has yet to build an jet transport, but plans for two have been approved and work is underway. Sud-Aviation and SNCAC will collaborate to build the two jet A.216 Caravelles. Ward Pollock is also planning a transonic plane, the H.D. 45 (AVIATION Week Jan. 17, p. 54).

Features of the Canadair's design is the location of the engines in nacelles on either side of the fuselage just forward of the tail. Sud-Aviation believes this arrangement will allow the aircraft to be built with optimum aerodynamic characteristics and will reduce engine noise within the cabin.

The Canadair will be powered by two Rolls-Royce Avon R.A. 16 engines of 6,000 lb. thrust each. It has a maximum range of 1,000 mi. Cruising speed will be 450 mph. Wing span will be about 110 ft., length about 100 ft. and maximum gross weight about 85,000 lb.

The H.D. 45 will be the jet successor of the H.D. 31 which is now proving its teeth to be as extremely economical cargo carrier. Like the H.D. 31, the jet H.D. 45 will be a high-wing monoplane with a high-aspect-ratio wing. Range will be 165 mi. It will also be powered by two Rolls-Royce Avon R.A. 16 engines of 6,000 lb. thrust. Cruising speed will be 490 mph., length about 100 ft., maximum gross weight about 100,000 lb.

Other French aircraft on the show included the two big four-engine planes, the Breguet-Dassault Breguet and the Breguet-Dassault Breguet, and the Breguet-Dassault Breguet.

Two-engine Folland monoplane on display was the Folland 201 Novio, which first flew in 1950 and the S.C. 30 Breguet experimental version powered by two Serrano Atar 101B engines of about 5,000 lb. thrust. The production version of this plane has two Pratt & Whitney R-2850-CA-35 engines.

French transports included the UAT Canadair, an Av. Fanner Super-Caravelle, the DC-8A, a Boeing Stratocruiser, a Sud-Aviation and a Folland C.119.

► **Small Planes**—The Sipa 100 Marabout, built by Sipaeron, is a Sud-Aviation Marabout and used to be the smallest jet plane in the world, was the most interesting of the lightplanes.

The Marabout is a two-seater that first flew June 14, 1953. It can be used for training as a personal plane. It is powered by a Turbomeca engine of range of 350 ft. thrust. It cruises at 217 mph. and lands at 58 mph. Span is 12 ft., length 16 ft. and total weight 1,073 lb.

A jet transport, the Mat. Hélico 1321 Biennecord, was one of the new lightplanes on exhibition. It first flew Nov. 17, 1952. The Biennecord is a single-engine plane with a Pratt & Whitney 455-hp engine. It carries a pilot and five passengers, can take off in 410 ft. and cruise economically at 146 mph. Span is 41 ft., length 27 ft. Total weight 5,000 lb., range 750 mi.

► **Many Optics**—There were plenty of lightplanes on display. During the show, Sud-Aviation displayed the S.A. 310 Alouette, a light transport, not yet used for military purposes, but which will be used for heli-cams over a closed circuit by flying 750 ft. or 15 ft. at 37 mph. The Alouette is powered by a Salmson 9 NH of 165 hp. Length is 36 ft., blade diameter 35 ft., and total weight 2,775 lb.

Soviet displayed two jet fighters, the S.D. 1120 Ant and the S.D. 1120 Dyak. The Ant is powered by a

Turbomeca Astazou engine, which drives the solar compasses. Rotor diameter is 36 ft. and total weight is 2,645 lb. The Dyak, a Yakovlev-105 assault of military and contractors, is powered by a Turbomeca Palouge. The two-seat production version of the Dyak will weigh only 1,108 lb. and will cruise at 60 mph.

Among the French helicopters on display were the S.3100 55 which will be built under license by Sipaeron in cooperation with Fiat, Italy, the Bell 47 and the Hélico 360.

►

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New Aro Pact

An Research and Development Command is negotiating a new contract with Av. Aro, a subsidiary of Av. Brasil de Aviação Civil, for the development of the Avro Arrow. The contract will be for the Avro Research and Development Center at Toulouse, France. The new contract will be a continuing one-for-one type.

The new contract will permit Av. Aro to take over AEDC operations from the Operating Division of Scrivener & Flock which has been handling the work pending outcome of a congressional decision on the fate of Av. Avro's congressional status. Avro has removed restrictions on personnel of further below heads of the Avro Arrow program. Avro is to assume AEDC operations about Aug. 1 when the USAF contract with the S.A.T. Operating Division ends.

New Assistant Secretary of the Navy (Research and Development) is Raymond E. Fagler, president of W. T. Grant & Co., succeeding Herbert R. Asher, resigned Jan. 28.

Smith Is New Navy Air Secretary

James Hopkins Smith, Jr., naval aviator and former naval captain, last week was nominated Assistant Secretary of the Navy for Air—an appointment forecast by Aviation Week (July 4, p. 25). He succeeds John F. Fisher.

Promoted this year to captain in the Naval Reserve, Smith enlisted in the Navy as a seaman, 16 days in 1933, later completed flight training and was commissioned a naval aviator in 1936. He fought with the Flying Circus in World War II. He served as a torpedo bomber pilot aboard the aircraft carrier "Saratoga" and "Yorktown," was on the staff of Adm. Arthur W. Radford, now chairman of the Joint Chiefs of Staff. Smith has been special assistant to the Navy Secretary since 1951.

The new Navy Air Secretary managed Pan American World Airways' African operation before it was retained as vice president of PAA's Atlantic Div. He recently resigned as a director of Sixth Airways.

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AVIATION WEEK, July 13, 1953



Assistant Secretary Smith



B-36 BAROGRAPH is used to measure atmospheric pressure at various altitudes. It is used in the development of improved navigation electronics and instruments for instrument atmospheric flights.

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In the aerial wilderness above 40,000 feet, where temperature and pressure are purifying elements, Convair's B-36 is lone reassurance.

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both our military and transport designers research and develop for the greater efficiency of man and equipment in outer space.

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Engineering to the 11th Power.

CONVAIR

San Diego, California
New Mexico, Birmingham, Texas



"Plug-in, plug-out" simplicity in Avien's "TWO-UNIT" FUEL GAGE

This "repackaging" of Avien's capacitive-type fuel gage is 50% lighter and needs no field adjustment.

Up until now, most fuel gaging systems needed their basic bridge unit, an inductor, a bridge-amplifier and some shunt resistors. No field adjustment was required for the Avien tank unit or indicator. Avien held them to make close tolerances, so adjustments for individual fuel-cell-fairings were necessarily "built-in."

The bridge-amplifier (the "black box") was a different story. This intermediate unit was supplied as a common part, for universal application. And that's where field calibration had to be made.

There was only one answer, as far as Avien was concerned. The "black box" had to go.

Now in the Avien Two-Unit system, the necessary components for the bridge and amplifier functions have been built into the indicator case. The "black box" is eliminated, and so are many parts which were necessary to make the "black box" universally applicable.

The Two-Unit Gage gets its calibration down to "plugs, prints and go." And calibration is necessary—and that means that all parts designed for the aircraft must be interchangeable. Avien looks to new air "steel" parts.

To install the Two-Unit Gage, you don't need special jigs, special tools or special equipment, and you don't need installation instructions or data.

This new "package" brings savings all along the line. The basic system is reduced in weight by 50%. Installation time is cut. Less wiring and connectors are needed. Less maintenance is required. Trouble-shooting becomes easier. And fewer parts must be stocked for troubleshooting and repair.

In the previous system, additional functions for fuel management can be integrated into the basic gage—and with less complexity, than ever before.

The Avien Two-Unit Gage is now available to meet your manufacturing schedules. The indicator is available in either large or small sizes, with all varieties of fuel-cell-fairings. Every month, Avien produces over ten thousand major instrument components for the aviation industry.

We believe that Avien's Two-Unit Gage will contribute to the obsolescence of many earlier systems, including the ones. For further information, write or call us.



AVIATION ENGINEERING DIVISION
AVIEN KNICKERBOCKER, INC.
56-13 NORTHERN BOULEVARD, WOODSIDE, L. I., N. Y.



ARRESTING GEAR stretches across runway at Kunsan air base during F-4D trials.

Crash Barriers Save AF Jets

Nine of 10 fighters that crashed into runway gear suffered little more than damaged wheel fairings.

Seoul, Korea—More than \$2 million worth of USAF jet aircraft has been saved from serious damage or destruction by a crash barrier system designed at two fields in Korea for less than \$10,000 per foot, costliest (AVIATION Week June 15, p. 16).

The barrier system may be installed at nearly 3,000 sites, eliminating the need for costly structures to accommodate shorter takeoff and emergency "off" landings.

Safety officials objected to original designation "crash barrier" because they felt it had an adverse psychological effect on pilots. Official name now is "runway safety gear."

► **Trans-Nitro** Barriers—It is a simple construction. Two double, high-chromium steel bars are set into concrete platforms 155 ft apart on either side of the runway.

Between them is a nylon rope attached near the top to a fixed cable running the distance. The top of the barrier, striking the two bars, has caused no other side of the runway.

Chains weigh a total of 30,000 lb. They stretch out approximately 400 ft, parallel to each other and to the outer road.

Steel connectors to the nylon rope hold the cable to prevent pull-off.

When strands are cut, the gear resembles a chain saw.

► **Little Dangars**—An overhanging jet strike safety system with no steel cables. The system hangs by the steel wheel. When the aircraft hits the steel wheel, which ought to come bending over, the plane stops.

Four of the aircraft impact on the cable drop and shear behind the decelerating plane.

Since runway safety gear was im-

plemented in April, 10 jets in Korea have landed into the barrier—four on observe takeoffs and six on landings. No pilot has been injured or killed.

Except for an F-86 Sabre that overran after hitting the barrier, all jets striking the barrier have been damaged with the more firm damaged-wheel fairings.

► **Fist Confidence**—Ropes pull at least 100 ft to the checklist. Ropes run parallel to the checklist, on guides that it might encounter a heavily loaded aircraft pulling low but successfully microflied. It hasn't, and most pilots now have confidence in the writing gear.

Ropes are set up at K-2 in Tengu and K-14 in Kunsan. They are used during all major takeoff and landing operations.

Here is how the gear worked in these cases:

► **A Sabre pilot of the 51st Fighter-Bomber Wing** running from his station was very low on fuel and landing long and fast. He struck the barrier at about 150 mph. The main wheel struck and engaged the steel cable 45 ft from the right overshoot. After running 32,232 ft of chain, the plane stopped with only minor damage to gear bending down.

► **An F-4 pilot of the 51st Fighter-Bomber Wing** flew a low and fast turn off of his plane on takeoff. He was running at 1,000 mph. He struck the barrier at 100 mph. He avoided thermal and hit the barrier in the center at about 150 mph. The plane stopped at 47 ft, moving all but three of them on each side.

Without the barrier, the F-4 probably would have run into a drainage ditch 500 ft away. An official report

said in this case the aircraft "exploded" and would have been destroyed and the pilot "injured, if not killed." Report based the case as an "accident" instead of an accident because damage was negligible and there were no injuries.

► **Pilot whose Sabre flipped over after striking the barrier was flying in "long and fast" and was low on fuel after a combat mission.** He landed his broken F-86 in before hitting the barrier. That puffed the plane to the left. It ended into the barrier 45 ft from the left structure in a slide to the right. The main landing gear broke up the slide, but the nose gear collapsed and the right wing tip dug into the ground. Pilot flipped over his back and avoided 27 ft in 1/4 of the craft moved 27,000 ft.

The aircraft certainly was destroyed, but an official report said "plane would have been destroyed anyway." Next day the pilot flew another mission.

► **Practical Cost**—Cost of arresting gear is estimated at \$3,000 per jet. Each field equipped with it has one barrier, one at each end of the runway.

The 300 ft of chain for one barrier costs approximately \$3,000. Each field is about a foot long, weighs 51 lb and costs \$7.00.

Nylon webbing, replaced after each incident, costs \$136.

Structures, sand and lowered man-made, cost \$1,318 per pair.

Rope, including gear in the result of many winds, costs \$1,000 to manufacture. By May, Gen. Smedley B.充满了. For Eastern Air Force vice commander who conceived the idea and sponsored development at AF's 640th Maintenance Group in Japan.

Baetzold wanted a practical arrest gear with these attributes:

- Low maintenance.
- Economical to build.
- Air mobility. (The chain can be dismantled and stored but in case the field is destroyed.)

► **Ruth Goldberg Inventor**—In tests and emergency use, plane reported only "one shock" after crashing onto the barrier. Peak of deceleration is listed at 4.6G. It takes two to three Gs to generate severe shock.

Peak of deceleration is reached when the plane is pushed 3 ft from the barrier, pushed about 32 ft from the barrier.

► **Cost**—An F-4 aircraft is reached when the plane is pushed about 32 ft from the barrier, pushed about 32 ft from the barrier.

► **Aviation safety officer said, "There's a lot of money to save with a Ruth Goldberg invention. I call it practical engineering."**

TIMING DEVICES

MILITARY APPLICATIONS



HAYDON, through research, development and engineering, is able to introduce timing devices and devices that offer major advances over previously available equipment. The 2000 Series Delayed Time indicator is an engineering example. Designed specifically for 1000-ampere circuit breaker, it offers equipment, overall diameter is only 3.125" x 3.4375" high and it weighs only 3.25 lbs. and current consumption is less than 0.5 watts and 0.15 watts in units of time of less than 0.5 seconds and repeats. Write for Engineering Bulletin No. 4.

HAYDON 2100 Series Delayed Time Indicators provide simple, compact and accurate metering of delayed time for 60 cycle operation.

HAYDON 2200 Time Delay Relay is designed so that the synchronous motor performs its true function as a time switch. Switching work is accomplished by a relay coil which, when energized, triggers the time switch to release at the end of the delay time. Write for Engineering Bulletin No. 5.

Series 2300 HAYDON Time Delay Relays provide time delay or interval timing at ranges from 0 to 10 minutes.

HAYDON 2400 Series automatic reset, 60 cycle time delay units can be used for either time delay or interval timing.

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Solar Delivers Small Generator for C-124

Solar Aircraft Co. will deliver the seventh of a large order for the world's largest generator, a solar generator for the Douglas C-124 Globemaster.

Weight of the 50-kw. turbine, with generator, is estimated at 175 lbs.—half that of a conventional independent power source of the same output, the company says. Complete with generator, the unit weighs about 215 lbs. and delivers approximately 25 kw for operating C-124 aircraft while on the ground.

The new unit also is tamper-proof during landing and take operation as a steady boost for regular powerplant-generator-battery systems.

Solar developed the generator and solar portable. The company located at Washington recently to prevent foreign nations blocking these and other potential applications.

Units cost by Solar officials:

- Cargo plane auxiliary power. Solar says an infrared generator is under consideration for other cargo aircraft than the C-124.
- Ground cargo starting carts
- Aircraft pressurization units
- Mobile fire-fighting equipment
- General-purpose power unit. The generator can be used at some Aladdin bases to warm diesel engines in cold weather and to start them.

The turbine is relatively compact. Discharge temperature is about 100° F. However, high weight, complexity and high power output more than fit in many places where continuous operation is not required and fuel consumption is not an important consideration. The engine is designed for extreme strength, reliability and to provide simplicity of operation.

Unit going into the C-124 passed its qualification tests up to the required 28,000 ft. altitude and -45°F. temperatures.

C-124 Crash Cause:

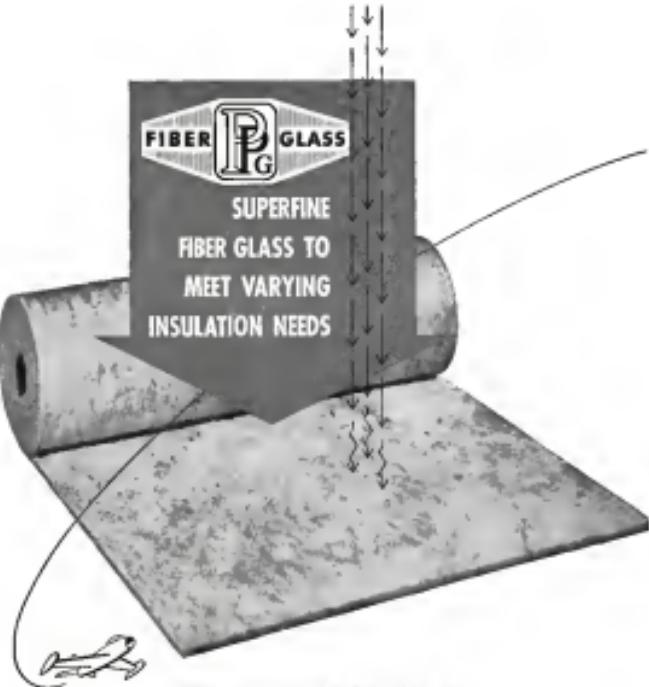
Part Failure, Pilot

The crash of a C-124 near Tokyo that killed 128 American AF personnel was caused by mechanical failure and pilot error, the Kao Kao Air Forces reported last week.

Complete investigation showed that the January 30 crash was caused by a sheared generator shaft followed by application of full raps too early on the approach for a three-engine jet when a wide return to the field, the report said.



SUPERFINE FIBER GLASS TO MEET VARYING INSULATION NEEDS



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SOCONY-MOYNE OIL COMPANY, INC. AND ARIZONA MOBIL OIL COMPANY, DIVISION OF MOBIL PETROLEUM CORPORATION

PRODUCTION ENGINEERING

SAE Forum Exchanges Information on:

Making Jet Buckets and Blades Better

Panel discussion of manufacturing methods, materials shows usage depends on equipment, experience

The what, how and why of jet engine bucket and blade manufacture was closely examined at the recent production forum of the Society of Automotive Engineers' National Aerospace Meeting in New York.

The discussion—in the form of a panel discussion with audience participation—looked into most current manufacturing methods and materials, as well as many still in the experimental and development stage.

The discussions were plotted around the practical shop level. A major conclusion one could draw from them was that usage varies widely, depending on a particular company's equipment and experience. What is available for one organization may not be good for another.

The questions and answers that follow approach the major points made in the blades and buckets meeting.

Forgings

• **WHAT** factors should be considered when choosing between rough or precision forgings for processing?

Type of material, quantities involved, surface finish required, tolerances and price should be considered. In general, parts machined from rough forgings will meet closer tolerances than precision forgings, but it is often better to be able to tolerate a 0.07 in. on one contour and 0.07 in. on another contour. Close tolerances can be held but only at the expense of higher tool and die costs.

Tool and die life can be maximized to meet good surface finish on precision forgings. This is not critical on rough forgings since stock is removed in machining.

• **WHAT** methods are used to remove the type of forging surface finish from precision forgings? Some methods used include abrasive belt, sandblasting, such as sand pebbles and pebbles, and no protection for heating of dies. In some of the newer installations, these have been corrected and a more inhibitory will be produced. These are cause doubt as to the possibility of precision forging by the impactor method.

• **WHAT** work best done on the outside of dies?

A limited amount of work has been done, but not enough to evaluate the process.

In cases where companies were using both precision forgings and machined rough forgings, the preference returned about equal.

• **ECCS** forging to size must excess gross presentation to Nimonite 30 alloy?

Control of grain generation requires a careful control of the percentage of deformation, temperature, and time at temperature. Under 7% deformation is good because the tendency to form large grains. It has been found necessary to heat the final forging slightly above 1100° F. in order to prevent cold cracking for grain size. One forging vendor reports he has noticed definite evidence of heat resistance in grain size. His tests were acceptable, and further work along this line might be beneficial.

• **WHAT** is the minimum trailing edge thickness obtainable by forging blades from Nimonite 30?

A thickness of 0.15 in. can be met, but for large production runs 0.30 in. is more practical because of tooling considerations.

• **HOW** does surface condition of Waspalloy compare with that of S-116? Surface are comparable. Some difference in forging techniques is expected, with S-116 somewhat easier to forge. This is probably because of the larger expansion with that alloy. As background with Waspalloy is established, it will be quite comparable.

• **HOW** do Waspalloy and S-116 compare on grain size consistency?

In general, S-116 has been found to be more consistent.

• **WHAT** is the fitness of impact forgings?

Considerable work has been done recently on this type of forging. Some methods used include abrasive belt, sandblasting, such as sand pebbles and pebbles, and no protection for heating of dies. In some of the newer installations, these have been corrected and a more inhibitory will be produced. These are cause doubt as to the possibility of precision forging by the impactor method.

• **WHAT** work best done on the outside of dies?

A limited amount of work has been done, but not enough to evaluate the process.



KENTANIUM is being tested in several ways on the turboprop engine . . .



INTEGRAL bladed turbine wheel, and . . .



TURBINE BUCKETS. Photo showing (sheared) precracked sandcasting.

• **WHAT** is the common forging alloy?

The common used in high temperature forging is usually milled graphite in water. In the case of aluminum, lead is generally used.

Casting

• **HOW** do you determine whether to cast or forge?

In many cases, the answer is simple because some of the high temperature alloys cannot be forged. In other cases,

FOR SPEEDS BEYOND HUMAN CONTROL



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motors having high torque-to-inertia ratios, have been developed from basic research to an available production reality. Creative design for quantity production provides the answer to precision components today, for the control problems of tomorrow's aerospace.

Thorough engineering skill and the demanding production facilities of Kearfott are available to you for the development and manufacture of components for your systems. Technical bulletins describing standard items will be sent on request. Your inquiries on both standard products and special purpose units are invited.

REFERENCE EQUIPMENT
INCLUDES:
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International Division: 1000 Avenue of the Americas, New York, N.Y.

be available, cuts as low as .0005-.0006 in., and feeds as high as 60 fpm could be obtained.

• **WHAT** is the optimum grinding speed for stock removal on Nessic 500?

It has been found the greater stock removal with less grinding gives about a reduced speed of about 3,500 rpm.

• **WHAT** is the best method for producing the root radius on campanile blades?

Except where the slot is too deep, the radius can be forged to specification. In extreme cases, it has been possible to grip the blade in half on split precision dies and perform a bending operation on the slot. Other methods considered were the use of belt polishers or grinding with a cam follower arrangement.

• **WHAT** success has been obtained by the use of starters or low-velocity alloy sheet formers?

Some companies have obtained good results, others bad. Maintenance of the start is a major factor. The costly inventory for quantity production is then used.

Some companies prefer a close coordination between the forging and machining operations so that suitable seating points could be forged into the parts permitting the use of relatively simple fixtures.

Finishing

• **WHAT** are the most satisfactory methods of annealing tools?

Surface annealing is a very important consideration, particularly in forging operations. A number of companies have found anneal and grit blasting quite adequate. Others prefer continuous rust blasting with an acid type compound. A few organizations have abandoned surface annealing with the hydride de-stressing process.

• **HOW** can the tools on steels be removed?

Surface flanging tools can be removed by blasting. The inside surfaces at a very tremendous rate and is very difficult to remove. All blasting should be done in an oxygen-acetylene to reduce oxide formation as much as possible.

Most forging manufacturers remove only the surface scale and permit the oxide to remain on the surface until all flanging is complete, removing that surface in the finishing operations.

• **WHAT** are the metal methods of obtaining adequate surface finish on the disks?

The two most common methods are continuous honing and longitudinal micro-polish using one of the common available machines. In the case of machined blades the machined sur-

High Temperature BOLTS

It takes a tough, non-oxidizable bolt or withstood the temperatures of modern jet engines. Today, The H. M. Harper Company is manufacturing bolts, nuts, and other fastenings of the modern high temperature alloys such as Dantac, Ecoloy, A-286, and special grades of stainless steel. If you expect fastenings designed to withstand high temperatures, vibration, excessive wear, or other extreme conditions, Harper engineers and metallurgists will gladly assist you.

For over a quarter of a century, The H. M. Harper Company has specialized in the manufacture of corrosion-resistant fastenings for aircraft, naval, aerospace, industrial, medical, aerospace, and all stainless steel, and is today America's largest producer of such fastenings.

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An Aerotec P-904 Pressure Switch installed in the de-icing system of a Boeing Starliner performed without any significant failure during thousands of flight hours. Upon removal, no drift in the pressure setting had occurred, and the switch was still in its original condition.

Frequently used in the de-icing or cabin-heater systems of larger aircraft, the Aerotec P-904 Type Pressure Switches are also utilized to control ground heating blowers as well as flap, leading-edge and anti-icing devices.

Among the aircraft using Aerotec P-904 Type Pressure Switches are Boeing B57 Stratojet and B50D Superfortress, Grumman G-159P, Douglas C124C, North American AJ-1 and Chase C-119B. More than 15,000 units are in service today.

The definitive and conclusive tests of Spec MIL-E-5272 which the P-904 has successfully passed guarantee that Aerotec Automatic Controls will satisfy even the most rigorous specifications.

Aerotec Pressure Switches of various types are available for pressures ranging from 1.5" H₂O to 3,000 psi.

Let our qualified engineers help solve your automatic control problems in the aircraft field. Why not contact us on your pressure switch problems?

Patent Pending

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GREENWICH, CONNECTICUT

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General Offices: T. C. CROWN, LTD., London, E.C. 3, England; Tel. BURton 5-8888

THE AEROTEC CORPORATION

AIRCRAFT DIVISION

GREENWICH, CONNECTICUT

Designers and Manufacturers of Automatic Controls—Water, Refrigerant, Diesel and Gasoline Engines—Pressure Sensors, Gages, Alarms, Differential and Selector Types—Flow Switches—Temperature and Pressure Sensors—Solenoids—Dials or Thermometers

these problems and shop equipment may well spell the difference between a man being a hot-rate or a second-rate engineer 10 years from now.

More than 2,000 engineers gathered at the Sheraton Hotel for the two-day ASME meeting, with most of the 80 technical sessions devoted to aircraft. At one session, an Air Force technical experts described the Air Research and Development Command's propulsion windtunnel at the Arnold Engineering Development Center, Tullahoma, Tenn.

They noted the Korean war has proven the need for more powerful propellers in U.S. combat aircraft. The windtunnel, designed to explore the performance of propulsive systems, including range and fuel consumption for both aircraft and missiles, will put the U.S. well ahead in the design of future planes, they said. The windtunnel program was set by T. L. Wernhardt, technical director, USAF; John Noyes, project engineer, Aeroprop and Panel, Inc., consulting engineers; and A. J. Fornestress of Westinghouse Electric Corp. A scale model of the windtunnel will flown to Los Angeles for the meeting.

• Robert Fisher—J. W. Bartholomew, assistant chief aerodynamicist at Mac-



ITALIAN SAGITTARIUS JET

Three-view drawing details characteristics of new Andreussi Sagittarius which is powered by a non-axialized 900-shp West Turbomeca Marboré. Earlier pictures (Aviation Week Apr. 27, p. 5) showed a singleplace cockpit layout; these drawings suggest the craft can also be used in a two-place. Note the deeply swept wings and conventional landing gear with a tridisk.

IT'S AEROPROPS- FOR TURBOPROPS!

**Powerful Allison Team
Used in all Four U. S.
Turbine-Propeller Planes**

Turbine-driven propellers solve many urgent needs for truly high performing aircraft. They provide the answer to the desired combination of heavy payload, higher speed and longer range. Yet turbine engines, plus propellers, permit take-off and landing from shorter runways.

Our in front and pioneering to prove the place of turboprops in today's and tomorrow's aviation species are these U.S. Navy aircraft powered with in-bladed contra-rotating Aeroprops and Allison T40 twin turboprop engines.

Serving with all three is America's only commercial-type turbine transport—the Allison Turboliner. Equipped with Aeroprops four-bladed propellers and Allison turboprop engines, it is General Motors' contribution to the proofing of turbines and propellers in a broad band of military and commercial aircraft applications.



*Building for today
Designing for tomorrow*



Aeroprods

AERONAUTICAL DIVISION • GENERAL MOTORS CORPORATION
DAFTON, OHIO

MILLIONS OF HOURS TO



DEVELOP THE J-57 TURBOJET



*Model and模倣 of detail parts
and assemblies and development exp-
ense in design improvement work.*

Since World War II, the aircraft industry has gone through a technical revolution. Advanced turbojet engines now provide aircraft with flight capabilities considered fantastic only a few short years ago.

But many men, even those close to aviation, do not appreciate the vast effort needed to fulfill the promise of truly great engine performance inherent in these turbojet designs.

As just one measure of that task, take the engineering effort required in bring Pratt & Whitney Aircraft's mighty J-57 turbojet to its present stage of development. So great were the technical problems that almost three times as many design and development man-hours were needed for the J-57 as for the world's most powerful aircraft piston engine, the 28-cylinder R-4360 Wasp Major . . . and almost *thirteen times* as many man-hours as for the R-2800 Double Wasp, one of the most powerful piston engines of World War II.

While design and development time is only one phase of jet engine production, it illustrates an entire industry problem. It also helps demonstrate why—today as always—dependable engines take time to build.



The above chart illustrates the tremendous increase in design and development man-hour requirements from the 28-cylinder R-2800 Double Wasp piston engine to the mighty axial-flow jet, the J-57. Design and development is, of course, only one phase in engine production. But the relationships illustrated here are typical of all phases of manufacturing the advanced, complex aircraft engines required today.

Pratt & Whitney Aircraft

MAIN OFFICE AND PLANT: EAST HARTFORD, CONNECTICUT
BRANCH PLANTS: NORTH HAVEN, SOUTHBOROUGH, MERIDEN



ONE OF THE FOUR DIVISIONS OF UNITED AIRCRAFT CORPORATION



NEW DC-7's GO SKYDROL!

Monsanto Fire-Resistant Hydraulic Fluid Specified For All DC-7's On Initial Orders

Plans for AMERICA, DELTA-CMS, NATIONAL and UNITED will carry SKYDROL in either the hydraulic system or cabin supercharger transmission, or both.

SKYDROL is now being used by 58 major airlines. Here are the reasons for this wide and growing acceptance.

SKYDROL is fire-resistant . . . the only such fluid which can be used in both cabin supercharger transmission and hydraulic system, as well as other areas.

SKYDROL has double the lubricity of conventional hydraulic fluids.

SKYDROL expands the service life of hydraulic components, cuts maintenance costs.

SKYDROL is nontoxic . . . noncorrosive . . . stable at required operating temperatures and pressures.

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All of the above
reasons represent
real advantages in
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are the reasons why
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steel floor, 40' x 110' x 30' high.

Lockheed Aircraft Corp. Burbank, 202, 300-000000. 1,000,000 sq. ft. plant, 100' x 110'
x 30' high. 100' x 110' x 30' high.

McDonnell Aircraft Corp. St. Louis, 217-10-
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McDonnell Douglas Corp. Long Beach, 217-10-
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x 30' high.

Aviation Week Picture Brief



UNDER LIGHTS. New steel test facility at Convair San Diego test base
is night operation. Siting w/ of Pylegen

Convair Flying Boat Test Dock

A large aircraft facility for
shelling flying boat structures is
operating at Consolidated Vultee
Air-Craft Corp.'s San Diego Div.

The facility is equipped to apply
loads ranging from 60,000 to one
million pounds, from six directions
and can handle one single load up
to 200,000 pounds per point.

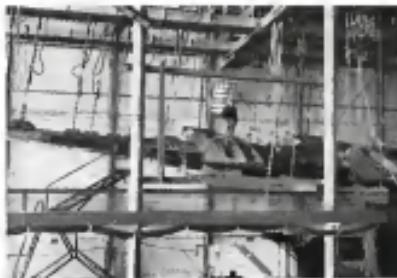
In a recent R/V wing test, 5,000
pounds in 1200 loads increasing 500
lb. were glued to the tested surface.

Thus, a "sandwich" arrangement
allowing the load applied
by hydraulic jacks, was used to day
load areas until the operations force
decided to be concentrated.

Another test scheduled shortly for
the new facility will be on the R/V's
passenger hull. Eleven different
loading tests will be run in a check
out under simulated light at 30,000
lb.

The test dock is constructed on a
3.5-ft-thick concrete foundation
spreading over 19,600 sq. ft. Minimum
height of the test structure is
67 ft., with working heights of
67 ft. and 15 ft. available in different
locations for the structure at a
flight-line siding.

A separate building houses re-
pair equipment and space for main-
taining personnel.



UNDER LOAD. wings can be tested in destruction at Convair test facility.
Convair castle pressure of 30 psi to test apparatus.

FINANCIAL



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Airline Dividend Record and Forecast

(On a Per Share Basis)

Carrier	1947	1948	1949	1950	1951
American	\$1.00	\$1.00	\$1.00	\$1.00	\$1.00
Boeing	\$1.00	\$1.00	\$1.00	\$1.00	\$1.00
Continental	\$1.00	\$1.00	\$1.00	\$1.00	\$1.00
Delta	\$1.00	\$1.00	\$1.00	\$1.00	\$1.00
Eastern	\$1.00	\$1.00	\$1.00	\$1.00	\$1.00
Midwest	\$1.00	\$1.00	\$1.00	\$1.00	\$1.00
National	\$1.00	\$1.00	\$1.00	\$1.00	\$1.00
Pan American	\$1.00	\$1.00	\$1.00	\$1.00	\$1.00
TWA	\$1.00	\$1.00	\$1.00	\$1.00	\$1.00
United	\$1.00	\$1.00	\$1.00	\$1.00	\$1.00
Varig	\$1.00	\$1.00	\$1.00	\$1.00	\$1.00
Others	\$1.00	\$1.00	\$1.00	\$1.00	\$1.00
Total	\$1.00	\$1.00	\$1.00	\$1.00	\$1.00

1947-48-49-50-51
Dividends of 10 cents per share.

Airline Investors Want Dividends

Carrier stocks previously sold on growth appeal; now buyers are looking for regular cash payments.

In placing its money there on a regular quarterly dividend basis National has taken a long step toward in meeting its responsibility of corporate stability for its own company and that of the industry as a whole.

In the recent past each divisional manager has been given the task of building up a separate status with an earnings record of its regular schedule of payments. But this was characteristic of an industry constantly expanding and requiring almost continuous re-investment of earnings. Airlines continue to build their big strengths in the growth qualities of the industry and the hope that within a reasonable amount of time would establish a degree of financial stability.

► **Dividend Impression:** An excellent record of returning the fruits of stockholders' regular quarterly cash distributions. This has resulted at least four tangible demonstrations during the year of the company's progress, all serving to build a favorable financial image.

In the first place the air transport industry has attracted a broader and more diversified group of investors who do not have the same patience in understanding the basis for justifying so large a dividend as the rate of return.

This is an increase as it indicates an annual dividend rate of 6% on its common stock payable July 10 and Oct. 3, respectively. This is an increase as it indicates an annual dividend rate of 6% on its common stock payable July 10 and Oct. 3, respectively.

► **Boehling Buzzed:** Other carriers who have been and continue on a regular

basis to present themselves as a reliable source for investment purposes among local industrial groups offering attractive prospects in earnings and dividends.

As long as capital demands in the air transport industry continue, there is a good market for the growth of the industry. The other industrial situations which have a steady attraction of their own. For this reason the airline must face with the necessity of providing a larger measure of income rather than low per cent in the past if improved investment return is to be attained.

► **Financial Impression:** An excellent record of returning the fruits of stockholders' regular quarterly cash distributions. This has resulted at least four tangible demonstrations during the year of the company's progress, all serving to build a favorable financial image.

In the second place the airline industry has taken a constructive action. The company declared two quarterly dividends of 15 cents each on its common stock payable July 10 and Oct. 3, respectively.

This is an increase as it indicates an annual dividend rate of 6% on its common stock payable July 10 and Oct. 3, respectively.

► **Boehling Buzzed:** Other carriers who have been and continue on a regular

This unique flow control device, able to withstand high pressures and both high or low temperatures, has brought a new standard of accuracy to the measurement of air flow and research work. It is used in highly corrosive liquids. It is also being used in many jet and rocket test programs.



Potter Flowmeter First in Research

► **Research Installations:** throughout the United States and Canada have adopted the Potter Flowmeter as their standard for accuracy. Simplicity, stability, dependability and ruggedness, combined with an ability to operate in either the vertical or horizontal position, are only a few of the features that have caused leading aircraft research organizations to specify Potter for all new test installations.

► **Rocked Propellants:** are measured easily and accurately with the Potter unit, which with-



Twenty-eight inch rotating disc type flow Potter flowmeter. It indicates accurate high speed.

stands high or low temperatures, high pressures and strong acids. Liquid oxygen, formaldehyde, liquid nitrogen and other liquids considered "hard to handle" are better measured by Potter systems with safety and precision.

► **Engine Test Cells:** have standardized on Potter for safety as well as ease of installation, wide rangeability and accuracy. The Potter sensing element is inherently explosion proof, unbreakable, and has no gaskets, pressure seals or sealing bolts. The electrical output is too low to cause a spark under any possible conditions.

► **Airplane Reading:** of flow rates has been made possible through the development of instruments whose precision approaches the Potter sensing element. The Potter-Brown Precision Flow Indicator has a scale with a graduated length of 36 inches, marked with as many as 500 divisions. Since the flowmeter is linear, linearity is therefore at a high or low flow rates. If necessary, the effective scale length

can be divided by using a dual scale.

► **Recording:** flow on either a circular or strip chart provides permanent test records. The Potter-Brown Strip Chart Recorder, having a graduated chart width of ten inches, and available in a variety of chart speeds provides accuracy, convenience, and ease of reading.

► **Top Speed:** labels are on many of the projects in which Potter equipment is being used; but most users are able to give preference to the operation of their Potter Flowmeters. If you are measuring flow, and you're not already using a Potter Flowmeter, ask your associates and acquaintances in the industry about this new method of measuring flow. Their experience may help you to solve your flow measuring problems.

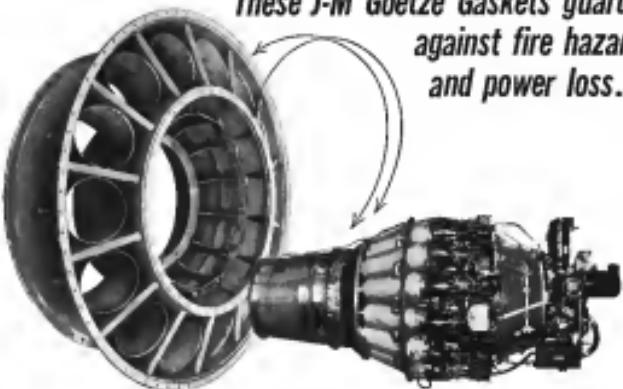
► **For Further Information:** State whether you are interested in indicating, recording or controlling flow rate. Specify if you require airborne equipment. Write to:

Potter Aeronautical Company

67 Academy St., Newark 2, N. J.

Phone Mitchell 2-5525

These J-M Goetze Gaskets guard against fire hazard and power loss...



Arrows point to J-M Goetze metallic gaskets on the outer and inner annulus, and their approximate location on the J33 turbojet engine turbine case.

...on powerful turbojet engines like the J33

Sealing the inner and outer annulus on the J33 to prevent leakage of fuel and flame into the turbine is another example of the many tough, critical sealing jobs entrusted to Goetze custom crafted metallic gaskets.

For this particular service condition, the Goetze gasket specified is made from ultra fine grained aluminum, with the carbonyl bonded gasket applied on asbestos fibers. This construction provides the resilience needed to overcome the surges experienced in these applications. Like all Goetze gaskets, this style is specifically made to fit tight and stay tight in service.

Why not write for further information about Johns-Manville Goetze gaskets... and other J-M flight proved products for the aviation industry. Address your copy of Brochure AV-1A, Address Johns-Manville, Box 60, New York 16, N. Y. In Canada, 199 Bay Street, Toronto 1, Ontario.

There is a Johns-Manville Goetze gasket for practically every jet air-



Close-up of J-M Goetze metallic gaskets used as outer and inner annulus gaskets on an engine turbine frame.



Johns-Manville PRODUCTS for the AVIATION INDUSTRY

quarterly dividend base include United, Delta, Western, and Continental. United has been paying 25 cents quarterly since early 1952 and paid an extra 50 cents at the year-end.

Statistical dividend payment policies remain in effect on the common stock issues of American, Eastern, and Pan American World Airways.

The table on page 44 records the record of each dividend distribution of the U. S. travel issues since 1946, with the total paid 1952 included.

The eastern passenger aircraft issue all have an issue dividend from time of least 1951 and, in most cases, back to 1949. Causes not nor making cash distributions are Braniff, Capital, Colorado, Northeast, Northwest (transient stock), and TWA.

Of the latter group, Capital has the best prospect at stabilizing cash payments on its stock. Its recent earnings have shown consistent gains, but heavy capital expenditures preclude immediate dividend payments. Colonial has never paid a cash dividend and its prospects of doing so are remote in its present corporate structure.

All dividends due as the preferred stock issue entitlements and paid by American, Northwest and United are being paid when due. In fact, with the exception of the preference stock of Northwest, which ultimately made good all payments due, the dividends on the senior equity issues of these carriers have been paid as scheduled from their very inception, even during periods of adverse earnings. This has made for a good credit system. Northeast, which was temporarily at a standstill on its preferred dividend payments, recently cleared all arrears.

► No R.R. Steel-Craft dividends for the domestic bonds for 1951, unfortunately, because they are not required to exceed the aggregate of some \$12.6 million paid to stockholders during 1952.

The increased capitalization of United and the extended cash dividend requirements are more than offset by the elimination of about \$375,000 paid to Chicago & Southern in dividends last year. In place of the C&S equity there has appeared \$16.7 million in 5% debenture bonds to Delta-C&S, which require annual interest servicing payments of \$555,000.

For the moment, a favorable issue to be absorbed by operation is interest on debt.

Nevertheless, the reduction of stability "creeping" into the air transport industry through the form of regular dividend disbursements is a constructive development. This further highlights the necessity of maintaining profitable operations, with natural earnings so that reasonable dividend payments can be made to promote a healthy industry.

—Sieg Althaus

FOR
MILITARY

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APPLICATIONS



All the experience of 35 years of transformer building is now available to meet your needs. Buyers of electronic and MIL-T-27 transformers, they are well known engineering laboratories. Adequate facilities for designing quality transformers are available on your requirements.

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TRANSFORMERS

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In less time than it takes to do one by any other method

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Easy and natural to use. Weighs less than 1 lb. Complete, perfect, uniform twist with split-second, effortless action. Two sizes = 12" and 9" length. 8 tools in one... plain... cutters... twisters. Unquestionable money-back guarantee. \$15.50 each. \$155.00 ea. in dozen. P.O.B. Sacramento, Calif.

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AVIONICS



RESEARCH ENGINEERS solve problems in design of electronic items for aircraft.



ASSEMBLY LINES produce reliable units to be used in guidance equipment for missiles.

NAA Builds Expert Avionics Team

By Philip Klass

Downey, Calif.—North American Aviation, Inc., a main power in the aircraft industry, has assembled a staff of avionics experts which could make it a major power in the electronic industry.

NAA's avionics potential and growth has been obscured by its highly classified missile guidance and control work, and has been overshadowed by the phenomenal growth of its neighbor,

Hughes Aircraft Co. (Aviation Week, May 25, p. 14, June 29, p. 44).

Expansion Possibilities—North American's president, J. L. Atwood, says the company has no present plans to expand its avionics activities or to expand its aircraft staff as needed to support its own missile and avionics programs.

However, Atwood doesn't rule the door to the possibility of NAA moving outside the aerospace and missile business, even though he feels that aircraft

company management have their hands full with aerospace development problems.

Asked about the possibility of North American applying its avionics research and design company know-how to research and development of the Hughes Aircraft Co. in comes, Atwood told Aviation Week that NAA's engineers "would be well equipped for such activities . . . if it is a possibility."

The report that NAA has been advertising for educated marketing analysts may indicate that Atwood and North American are open which they don't yet ready to talk about.

► **Big, Big Job**—High-Fit records and possibly competitive reasons, NAA hasn't disclosed the number of professional scientists and engineers in its avionics group—called the Electro-Mechanical Engineering Dept.

A company official says that the EM engineering group is one of four major departments in the Missile and Control Equipment Division which employs approximately 4,000 persons in research and development. The majority of these, the official says, are engineers or technicians.

Dr. N. E. Bollerier, who directs the EM engineering group, and the number of its professional scientists and engineers is comparable to that of the Hughes Research and Development Lab. (Aviation Week, June 12, 1960).

► **Competitor**—With Hughes' Company of North America's EM engineering department with the Hughes R & D Lab. can be added to NAA, but it is only logical. Both moved from research into avionics via missile contracts at about the same time (1947). The company's growth has been concentrated with that of aluminum faced both its capacity to assemble large economy units.

A major difference between the two companies is that Hughes moved into the interceptor fire control field in 1948, which has since developed into a \$19-million-a-year production. NAA North American entered the fire control field only a couple of years ago and its activities at present are limited to development.

NAA doesn't talk about the status of its long range missile program for security reasons, but a visitor gains the impression that there is yet not yet large-scale production of missile equipment for missile groups. However, North American still runs the handle and helical series of actuating up and starting mechanisms on its current equipment.

North American is putting some emphasis on photointerceptor lenses on some avionics equipment. One such system is described as being "an impossible complexity in an airplane you thought serious."

► **Advanced Fire Control**—NAA is de-



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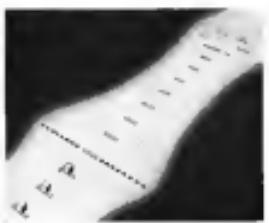
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Over 3 billion candlepower—man's most brilliant light source—can help supply aviation's "missing link" during restricted visibility landings. An exclusive Westinghouse innovation in lighting equipment, it can become a truly effective key element in Approach Lighting Systems, guiding the pilot from approach portal to runway threshold. It conveys the thickest weather and permits earlier, positive identification of the runway approach on transition from instrument flight to visual contact... long acknowledged as the most critical period during any instrument approach.

This extreme penetrative power is achieved through Westinghouse engineering which couples a number of Krypton Flash units with a master flash synchronizer. At maximum intensity this combination can produce 4,000 feet of zero-zero visibility by a series of 3,000,000,000 candlepower flashes seen as a "lightning stroke". When incorporated with starburst burning lights in a proper approach lighting configuration—it eliminates the possibility of the system being confused with any other lighting pattern. And for safe follow-through, Westinghouse also provides powerful HI-intensity Runway Lights for final maneuver definition.

This application of experienced lighting research... Krypon and flash synchronization... to produce peak output and the unique armature stroke effect is a typical Westinghouse solution to Aviation Industry problems. And, most important, this positive identification provides an essential step in bringing truly safe, accurate and dependable flight. One Step Closer. Westinghouse Electric Corporation, P.O. Box 565, Pittsburgh 30, Pa.

J 3005

The Krypton Flash unit is shown at left with the regular Krypton lamp in place. The flash lamp only 17 milliamperes and is too short in duration to have a blinding effect on pilot. Lamp is about 100 degrees. A lower rate of frequency is provided for later visibility enhancement. At right is a typical approach pattern where the Krypton Flash units are superimposed on a single row, center line series of steady burning lights.

THE SCOPE OF WESTINGHOUSE IN AVIATION

Basic aircraft systems

Turboprop Engines, Flap Control, Radar, Antennas, Communication Equipment and Electrical Systems.

Ground equipment

Wind Tunnels, Airport Lighting, Industrial Flame Arresters.

Airplane system components

Transformers, Rectifiers, Instruments, Gyro-motors, Temperature Control Panels, Generating Equipment and Hydromotor Control, Circuit Breakers, Contactors, Motors, Arrestors and Hosta-Electric Tubes, Mercury, Mercury-

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veloping an advanced electronic fire control system for the USAF and doing some work with the Royal Canadian Air Force of Amherst. The Air Force is expected to search the world for this program closely to see whether it gets a better response when the aircraft and fire control are designed by a single manufacturer. (Aviation Week Nov. 24, 1952, p. 17)

Asked about the report that this system would make independent use of microwave amplifiers, Dr. Edelstein said that this would be used instead of vacuum tubes whenever feasible but added that it is "a complicated matter, the answer." Edelstein says that the IBM group is striving simplicity and ruggedness and is "not at all interested in push-pull." He predicts that the NAA fire control will be "superior" to any existing system.

Edelstein says NAA will not restrict the application of its fire control system developments to North American aircraft. Several other aircraft companies have expressed an interest in the NAA systems and "we have been quite receptive," he points out.

System Envisions Neural. The hardest part of designing fire control is what Edelstein calls "system development." This task requires much basic dependence on existing fields of knowledge: fire control, flight control, fire control, flight control, fire control, fire control.

The difficulties, Edelstein says, is that an engineer who is a radar expert, for example, is reluctant to make a new professional shift to a computer or flight control group in which he is a "beginner again" at the beginning.

Advances in Digital Computers.—Clear after spurring North American's idea that digital-type computers are more flexible than analogs for fire control navigation and fire control tasks, North American's Vic Hawley and others, is working in the digital computer field. This work, however, is not limited to fire control, however. John R. Moore, says that the choice between analog and digital depends upon the specific job to be done. Moore says that in some systems, a combination analog/digital computer may be the best solution.

Carbon on Transistor.—North American is putting considerable effort into studying the application of transistors to its missile equipment but is moving cautiously in substituting them for present tubes. Edelstein says: "The ride function in characteristics between solid transistors and their prior analog vacuum tubes is the reason."

North American's transistors have some transistors, but available in production within a couple of years and is currently "deciding whether to gamble on using them in a new computer design," according to Edelstein.



DR. R. L. EDELSTEIN, working



SOLDERING a lead wire equipment



PUTTING in time to hermetically seal it

Aviation Week, and are hoping for enough time banking to do just that.

Edelstein's discussions with Airwood leave this impression that NAA will move much more slowly and (probably) than Douglas did. One gathers that Airwood views NAA's research activities as a means to an end—better airplanes and missiles—and not as an end in itself.

FILTER CENTER

■ **MHI Tests New Aeroplane**—Mitsubishi Heavy Industries is testing its recently developed T-10 light freighter with pilot as an F-84 built to it by the Air Force.

■ **Hughes to Build New Overland Base**—Hughes Aircraft, which is currently executing a large modification and over-haul base for its fire control systems in Los Angeles, will soon establish a similar base in the East, a company spokesman says.

■ **Bendix Demonstrates New GCA**—A new type of ground control approach radar system developed by the Bendix Radio Division of Bausch & Lomb recently was demonstrated in 40 separate flights at the Navy Dept., Marine Corps and the Air Navigation Development Board, the company said. Details of the new GCA are classified but spokesman says that the equipment is designed for remote use.

■ **Britten Transistor Coming.**—To eliminate transistor failures caused in transistor, the industry is fast switching to hermetically sealed units. Hermetically sealed junction transistors are reportedly available from CBS, Philips and General in production and Westinghouse, General, and GEC in development. Electro-Arc is currently producing hermetically sealed point-contact transistors and Westinghouse Electric reportedly expects to be producing them by the end of the year.

■ **RCA Engine Intercooler Problem.**—Problems which Boeing encountered with the new RCA low-sonic ADC 10 intercooler system in Wichita last 8-17 are attributed to slow pickup of engine cooling and a misunderstanding of system performance given by an RCA spokesman. The low-sonic ADC-10 intercooler system was developed to reduce the cold time, RCA says, and Boeing has engaged in cold-flow alternate park-up. Based on information from a Boeing engineer, the spokesman in May 18 attributed the difficulties to the extreme sub-enrichment used in the ADC-10.

The
Beaver (L-20)



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fact that a single L-20
executed Team 8
Korean battle zone
over 200 litter cases
in a three-week
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Here's how leading automobile manufacturers

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Quick installation and low cost are just two of many reasons why America's major car manufacturers use Torrington Needle Bearings.

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From Marvel of 12 of the 15 passenger car manufacturers, all of whom enjoy the benefit of Needle Bearings.



EQUIPMENT



FIELD DESK, Mar and Kling vehicles are made up from shipping boxes.



NEAT "UNITED" package (right) compares with old-style hedge trimmer (left).

Air Units Can Live Out of Boxes

AF plans service trials of new containers that double as shipping packages and desks, hives, cabinets.

A simple container may hold either equipment or the key to greater mobility and swifter deployment of Air Force units.

The secret is in the box was lifted recently during USAF exercises in England, showing how greatly it may simplify air way supply and storage packing as well as transport and storage of aircraft and hives, or even carrying the personnel mobility of aircraft and of the implements which sustain the assault.

Equipped for either those three using it, a companion shown. That trial is expected the Strategic Air Command and Tactical Air Command that they required protection of aircraft and personnel and to determine the feasibility of aircraft and of the personnel mobility of aircraft and of the implements which sustain the assault.

► Service Test-In a test that was part of an audit from the U.S. to England, the new equipment cut storage time dramatically—from days to a day or two hours. Moreover, the air way employing the new system was better

equipped for either those three using it, a companion shown.

That trial is expected the Strategic Air Command and Tactical Air Command that they required protection of aircraft and personnel and to determine the feasibility of aircraft and of the personnel mobility of aircraft and of the implements which sustain the assault.

► Handi-Packages—The key is the combination of interesting, comprehensive studies by Beckel & Beckel Associates, New York, industrial design engineers, with offices in Dayton, Ohio, and London, England. Their suggestion from USAF was "in vacuum mobility of operational units" through development

of better packaging methods. B & B gave more than one idea. They not only packaging and repackaging by drawing AF how to live out of its packages.

B & B first used the equipment into two categories:

► Heavy maintenance equipment and stores needed for long-term operations, characteristic of a permanent installation.

► Basic essentials required to sustain an air unit efficient for a certain period, i.e., a month's time, at an advanced base, with stores supply lines established.

After carefully weighing the multitude of factors involved and exploring many means to the problem of stores and supply, B & B developed a special resistance tailored to the demands of availability. It is designed to be well-preserved at minimum cost and in bush in the "key" form with considerable interior, flexible enough to handle a wide variety of equipment, but strong enough to support storage and shipping and economical in space. This "key" form represented a complete combination of storage and supply concepts, B & B says.

The "assisted" design permits the stores to be made up into standard and mixed packages for easy handling by forklift trucks and pallets.

► Tool-Storing Features—While on the ground, the containers serve as the warehouse shelves, the compartmented storage bins, the Asia, Africa, South Africa and other facilities. In the air, they are the boxes in which the supplies are shipped. Contractors don't have to be disturbed by loading or unloading.

An air unit can apparently store its supplies and be ready to move in little more time than it takes to check out the aircraft and get up. "Warehouse" feature comes in here, too. B & B believes packages quickly become portable and stack up easily, saving space, which can be made up of enclosures moving in and without lost space.

The plan is not only faster, it enables fewer planes to carry more, reduces the number of manhours and other paperwork, formulates shipping procedures so that no time is wasted in a mission, cuts costs, and despite the standardization, provides greater flexibility in ship and aircraft assignments.

► Packaging for Aerospace—Beckel & Beckel found that one of the first requirements of aerospace is that no time or money should be put to a full through to the local lumber yard. Officers had wooden crates already made up in war time, since there was no standardization to go by. They were difficult to pallet for full exploitation of cargo space, too heavy, and weren't utilized until and unless there was a move.

B & B's containers are used all the



FRONT LINE SHUTTLE by Chase

Chase Assault Transports keep pace with the frenetic tempo of modern warfare — shuttling troops and equipment forward to combat areas — back with casualties to rear area hospitals.

Emergency airfields are not prepared. Chase C-130s land on unprepared fields — now, paratroopers drop fields.

And these versatile transports need amazingly little room to get in — and get out — fast!

No other aircraft can match these performance in this vital shuttle operation.

SHAR-TENSION LATCHES

minimizes the performance of the 8,100-hp Pratt & Whitney engine for engine intercoolers. Chase: Doctor T-3000s are used on C-130s in rear doors.



CIRCLIPSEEL partition sleeve. Suitable for dual-purpose containers.



100% SHIPPING, divides stack in center, makes room for packing other items. They are tough enough for shipment by rail or ship, light enough for air shipment. The basic unit is a flat, thin sheet of Aluminor, a laminated panel of a basic metal, aluminum, strengthened sheet selected for its exceptionally high weight-strength ratio and production forming qualities. It handles like sheet metal, but has certain vibration and fatigue advantages. Aluminor's cylindrical cans enable boxes to be assembled by crimping instead of riveting, welding or other joining methods.

The corners of the boxes are formed by notched, knifed extensions with "claw-like" notches which bite deep and cling securely without embedding into the edges of the usual flared panels or being stamped. The wood case collapses, without fracturing either case or adhesive, when given a sharp blow to be used as the cylindrical panel. The technique was developed by B. & B. with the cooperation of U. S. Plywood Corp., producer of Aluminor.

► Easy to Handle: Ridges at the top



FASTENER CORPORATION

Paramus, N. J.

Los Angeles, Calif.

'S' Monel...

an extra-hard casting alloy that resists galling and seizing at high temperatures



Since the start of day shifts, Monel has fully galled up to the bearing cage for a jet engine turbine shell. This bearing runs dry during the first moments of starting, causing a galling position for the retaining ring. This retaining ring (arrow) between the outer and outer bearing's centrifugal stand casting of "S" Monel, runs by Inco. "S" Monel not only offers a high degree of resistance to galling, but also retains its hardness at temperatures up to 1360° F.

Whenever you're looking for hardness in a corrosion-resisting metal, it's a good idea to review the characteristics of "S" Monel.

"S" Monel is one of the hardest and strongest of the non-ferrous alloys available in cast form. What's more, it combines the inherent corrosion resistance of Monel with two particularly valuable features: 1) high hardness at high temperatures, and 2) resistance to galling and seizing.

"S" Monel, in fact, possesses a hardness nearly as great as heat-treated steel. Temperatures reaching as high as 1360° F have but little effect on its hardness.

These have been instances where "S" Monel has shown unusual resistance to seizure, drag or poor lubrication — as no lubrication at all!

Another property of "S" Monel is that it is non-

magnetic and stays that way at all temperatures down to -29° F.

It is this combination of exceptional properties — and the ability to retain them at high temperatures — that make "S" Monel especially useful for cast precision parts that can be counted on to —

- take the heat of high heat
- maintain accurate alignment at high fit
- resist galling and seizing
- retain their resistance to corrosion, bacteria and wear

You'll find further information on "S" Monel in our bulletin, *Alco Standard Alloys for Special Problems*. Your copy is ready and waiting. Write for it now. And consult your distributor of Inco Nickel Alloys for the latest information on their availability from warehouse and mill Stockholder, too — it always helps to anticipate your requirements well in advance.

The International Nickel Company, Inc., 67 Wall Street, New York 5, N. Y.

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Mechanical Properties of "S" Monel ¹		
Yield Point	100% Proof Strength	Ultimate Tensile Strength
10,000 lb/in.²	10,000 lb/in.²	35,152 lb/in.²
10,000 lb/in.²	10,000 lb/in.²	35,144 lb/in.²
10,000 lb/in.²	10,000 lb/in.²	4.3%
10,000 lb/in.²	10,000 lb/in.²	200.0%
Coefficient of Thermal Expansion		
(20-212° F) in/in./°F	10.0000	10.0000

Hardness of "S" Monel at Elevated Temperatures²

Temperature, °F	Brinell Hardness
Room	220
200	220
220	210
250	210
300	200
400	200
500	200
600	200
700	200
800	200
900	200
1000	200
1100	200
1200	190

and reasons at the bottom of the case. Hinges allow them to be interlocked horizontally and vertically into compact, square-doll pallet loads, with oil spares included. The container can be assembled in a wide variety of configurations with the five key sizes. A number of them together provides a seat package both for the dock lift and the aircraft.

It can be identified by only one model, instead of one for each container as is the case with cold lifts.

Four sizes of the containers are provided with partitions made of T-wood, a laminated of low-cost wood core and high upper exterior, also produced by U.S. Plywood. The partitions can subdivide the container into 12 small compartments. These collapse for shipping to allow for maximum use of space. On the ground the partitions convert containers into storage and mass racks and bins in the absence of dock equipment.

During the summer in England, Aviations' Wincs' correspondent saw other examples of overpackaging. Some containers opened up into five dinner-size shelves, others into complete Tech Order bins, while others split tables and desks apart but from each other.

One container, the largest standard size, 62 x 62 x 14 ft, designed a C-47 field deck, with all pieces in under.

It is felt that B is exploring unusual uses of its mobile supply system, though it could be used either in air cargo and transport operations. It also is applicable to other fields of aviation, the firm believes.

OFF THE LINE

Stérela, subsidiary of Société Nationale de Construction Aéronautique du Sud-Ouest has signed a contract with USAF at Waco, Texas, to manufacture, for overhauling of a number of C-47 main engine test points. The work is to be done at Stérela's Marignac factory, with engine overhauls performed by Air France. Cost of the program is expected to run to \$10 million.

A contract involving \$35,000 for labor to overhaul 1,500 turboprops for R1150 engines has been received by Aerospace Division, Industries, Inc., Boxes 100, Air Force depot, the company reports. Address: 7500 42nd St. N.W., Rockville, Md. 20852, N.Y. N.Y.

Stek Airways will install complete Collins Radio Co. VHF radio equipment in its entire fleet of DC-4A and C-46 aircraft. Installation is scheduled to take place this summer.

NEW AVIATION PRODUCTS



Engine Shock Mount

A new engine shock mount for R1830 engines, to be lighter than any previous mount, has been announced by Lord Mfg. Co.

The Dynabolt mounting is lighter, claims the manufacturer, as to vibration characteristics and physical dimensions with types now in use on the Convair 240 and 340, Douglas DC-6 series, Martin 404, and military planes using the engine.

The weight savings, reduced with the new mount, the MR 18M, is as much as 16 lb per engine in some installations. The mount has been approved by CAA, USAF and Materiel, Lord reports.

A care renewal service has been set up by the firm to provide maintenance personnel to replace front shock absorbers and rear shock absorbers on the basis of the service time as indicated by writing to the company. Lord Mfg. Co., Erie, Pa.



Tiny Scavenger Pump

A scavenger of space and weight has been in a new compact, compacted dry-cogent oil scavenger pump developed by Lem, Inc.'s Ringer Pump Div.

The pump, measuring about 3 x 2 in., weighs 13 lb and is a positive-displacement, rotary-vane type operating from an assembly drive at the jet engine. Ringer claims the type of design

provides a simplified, more powerful pumping element in a smaller envelope.

The Model RD 9820, variant of the Ringer series, has a rated speed of 3,000 rpm, outlet pressure of 60 psi, flow of 6 gpm when pumping jet engine lube oil, Grade 100F. The pump provides a non-pulsating discharge and strong oil pumping factors of speeds 510 to 4,200 rpm, ambient temp., and pressures from 10 to 250 psi.

The shaft and pump parts, assembled in an aluminum alloy body, consist mainly of two blades. Blades in a cross plated rotor revolve at the base of the pump lever. The "developed" bore of the lever controls sliding action of the blades and lengthens life of blades and the lever, the company says.

Ringer Div. of Lear, Inc., Elkhart, Ind.



New Aircraft Hose

Aeroquip is producing G-1000 aircraft hoses that can be connected directly to fittings and flexible flexible tube connectors.

Hose fittings replace the hose with Erickson or Farnel tube connectors without need for fittings at inlets.

The fitting consists of two parts: Aeroquip's standard hose socket and the new nipple. It can be assembled in the hose with ordinary hand tools.

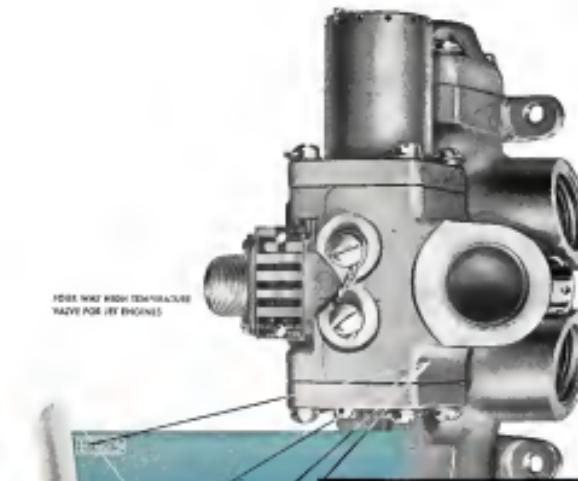
The hose is available in single or double-wire braid.

Aeroquip Corp., 310 S. East Ave., Jackson, Mich.

Silicone for Molding

A new silicone rubber, designated SE-360, can be used to produce uniform parts from ordinary rubber molds and shows total linear shrinkage of only 3% after oven cure, compared with 6% for similar compounds, says maker, General Electric Co.

Designed particularly applicable for casting bearings and for O-rings and packings in rubber where gaskets and seals must remain effective under raised pressure, SE-360 is said to have a compression set of only 3% after 22



CONTROL IS THE VITAL ELEMENT

Why is ADEL aircraft equipment the most preferred in the industry? It is all down to matching product to application. Close cooperation with aircraft and engine manufacturers, exhaustive tests and constant improvement have produced Aerial Hydraulics and Powertrain Control Equipment, Heater, Anti-Icing and Fuel System Equipment and Engine Accessories which match the industry's every application.

Above all, ADEL has the combination of specialized talent, experience and unequalled facilities needed for the successful solution of aircraft and engine control problems.

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ANNOUNCING
WIGGINS WIG-O-FLEX COUPLINGS
for connecting rigid tubes

**PROVED SUPERIOR
FOR FUEL, OIL, AIR**

- 87% lighter • installs easily
- Requires little more than hand tightening
- Accommodates 1/16" tube length variations
- Accommodates 1/16" tube misalignment
- Accommodates 4° tube flexure
- Requires only standard parts—**"O"** rings and tube ferrules
- Temperature range—40° F. to +250° F.
- Withstands more than 1,000 PSI burst pressure

SIZES
1/8", 1/4", 3/8", 1/2", 5/8", 3/4", 7/8", 1", 1 1/8", 1 1/4", 1 1/2", 1 3/4", 2", 2 1/2", 3", 4", 5", 6", 8", 10", 12", 14", 16", 18", 20", 24", 30", 36", 42", 48", 54", 60", 72", 84", 96", 112", 128", 144", 160", 176", 192", 208", 224", 240", 256", 272", 288", 304", 320", 336", 352", 368", 384", 400", 416", 432", 448", 464", 480", 496", 512", 528", 544", 560", 576", 592", 608", 624", 640", 656", 672", 688", 704", 720", 736", 752", 768", 784", 800", 816", 832", 848", 864", 880", 896", 912", 928", 944", 960", 976", 992", 1008", 1024", 1040", 1056", 1072", 1088", 1104", 1120", 1136", 1152", 1168", 1184", 1200", 1216", 1232", 1248", 1264", 1280", 1296", 1312", 1328", 1344", 1360", 1376", 1392", 1408", 1424", 1440", 1456", 1472", 1488", 1504", 1520", 1536", 1552", 1568", 1584", 1500", 1516", 1532", 1548", 1564", 1580", 1596", 1612", 1628", 1644", 1660", 1676", 1692", 1708", 1724", 1740", 1756", 1772", 1788", 1804", 1820", 1836", 1852", 1868", 1884", 1900", 1916", 1932", 1948", 1964", 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Write for your copy of the illustrated folder shown above describing typical examples of Warner precision hydraulic equipment.

above information to the Met. Office on telecasts and this set out the same in a G2 message for the benefit of all aircraft within the Calcutta flight information region. The G2 message was broadcast on airways frequencies between 2740 and 6747 kc. GMT.

The Coast is on its way to Calcutta from Rangoon with the following signal at 0419 kc. GMT:

"Request forecast time of storm passing Calcutta."

The reply to the above, the Meteorological Office, Davao, gave the following message to the Coast at 0431 kc. GMT:

"Reference your signal AAA November reported Davao was after 1110 kc. GMT."

The following special airfield warning for Davao had been issued at 0441 kc. GMT:

"Thunderstorms accompanied with squalls from northeast speed reaching 50 knots blew from Davao airfield and neighborhood between 02 1200 to 04 0000 GMT and 02 1600 to 04 0000 GMT."

The caption of the report on receiving the airfield warning referred to above stated by Meteorological Office of about 1812 kc. GMT and he was personally located by and had a discussion with the Davao Forecast Officer.

Subsequently an airfield warning issued by Rangoon and Davao, Davao was issued to the Asian Traffic Control at 1120 kc. GMT as an additional message for the Coast or flight but this message was not acknowledged by the Coast.

The actual weather conditions at Davao Davao at the time of takeoff were as follows: Weather: Very bad.

Wind: 30 km. per hr. 12 knots.

Cloud: 100% overcast.

Cloud: 200% overcast, base 1,500 ft., cumulonimbus, base 3,000 ft.; total cloud 100%.

The maximum affected altitudes set and Davao base.

NAVIGATIONAL AIDS

The navigation aids carried on board the aircraft and those available on the ground were adequate for the flight undertaken. It is considered that the navigational aids did not have any bearing on the accident.

FLIGHT FIGHTING EQUIPMENT

The fire fighting equipment on board the aircraft was adequate. There is an evidence that it was operated either manually or automatically. This is considered to be due to the nature of the accident.

EXAMINATION OF THE WRECKAGE AND TECHNICAL INVESTIGATIONS

(a) Location of wreckage

The main wreckage was located 24 miles from Calcutta Airport, Davao, Rangoon, on the front from Davao to Falim. It was lying in a water logged area. The main wreckage consisted of the fuselage section, two wings, one engine, one tail section, No. 26, half way down the passenger compartment, two wings up to No. 7 attached to the fuselage with the four engines in position. The rest of the components of the aircraft were found on a track 11 miles in length at a bearing about 354° T. The

different components of the aircraft were found in the following order on the track 11 miles:

Front engine cluster and port top skin, starboard outer cluster together with the lower left-hand mainplane skin, port, impinging with parts of one of the main struts and the left wing skin, port outer cluster, starboard wing skin, starboard outer cluster, port mainplane, starboard mainplane, port and starboard both outer wing panels, one portion of the fuselage and the main wreckage in the middle.

The terrain on which the wreckage was found is the following of paddle fields.

(b) General Observations

There were no scratches on the side panel where the different components of the aircraft had fallen. It indicated that the pieces had fallen in almost a vertical direction with no forward velocity.

(c) Condition of Wreckage

The main wreckage had been on fire. The main body of the aircraft had fallen onto the tail section in inverted position. There was some damage to the fuselage fairing directly due to impact and due to fire. Some of the rearward fairing panels had an area of fire damage. The rear fuselage had been damaged by fire and the position of the pressure dome indicated seven days ago that the pressure dome had been damaged. The port and starboard engine nacelles were also found broken from the main wing outboard of rib No. 7. Part of the port wing tip had broken due to fire damage. A deposit of smoke was found along the leading edge of the tip and abeam both on the port and starboard starboard wings. The port starboard wing had damage at three points on the leading edge. The port wing had suffered severe impact damage at the wing root. A small piece of the port leading edge of the starboard wing had suffered severe damage in the air between No. 7 and 11. At No. 11, the starboard wing had suffered severe impact damage at the point of the impact right up to the wing tip.

(d) Technical Examination of the Wreckage

(e) Examination of the wreckage indicated that

(f) The undercarriage and flap were in the fully retracted position.

(g) The main gear lever was broken and jammed. At the time the lever was in the "half open" position.

(h) High pressure and low-pressure fuel codes were "on."

(i) The flying control system damage lever was in their normal position.

(j) The elevator and rudder trim settings were about normal. The rudder trim setting could not be determined.

(k) The cabin was being pressurized as disclosed by the spill valves.

(l) The fuel temperature had not been operated, nor was there any evidence of any temperature change in the fuel tanks.

(m) Both the outer mainplane had failed at a station outboard of rib No. 7. On examination of the wing panels it was noticed that the top panels had failed in tension while the bottom panels had failed in compression. Indicating thereby a shear load failure of the wings. The top panels between ribs No. 7 and 12 indicated bending failure. The bottom panel consisting of

as dependable
as bendable

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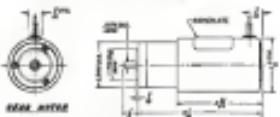
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A precision gear head combined with a miniature motor gives you the answer to high torque at low speed. The motor can be 40 cycles, 100 cycles or variable frequency—in single, two or three phase—with name-coded or self-coded frame types. The gear head is arranged to provide the output speed you require, with standard timing ratios of 10, 3600 or 6000 to 1 possible. High output torque, to drive, rotate or control, in constant stress, makes this line of way too robust, ideal for a wide variety of applications on the ground and in the air.



SPECIFICATIONS FOR MODEL GM489-1

400 Cycle DC/AC/DC Gear Reducer Gear Motor
400 Cycles • 100 Cycles • 1000 Cycles
Full Load Torque: 1000 lb-in.
Shaft Speed: 1000 rpm
Gear Ratio Selection: 10, 3600 or 6000
Mounting: 12" diameter x 12" diameter
Mounting Hole: 12" diameter x 12" diameter
Angular Response: +8° to -45° C

TYPICAL APPLICATIONS

Military and Aircraft • Pulse Lip Service • Automatic Instrument Control • Aircraft Controls • Automatic Pilot • Space Equipment • Electronic Control • Tools

Safeguard your gearheads in fractions of EAD
If your problem involves sending standard equipment, bring it to EAD. Our completely in-house engineers will modify any one of our standard units or designs and produce a special unit to meet your most exacting requirements.

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several small pieces had sheared off at various points. The top and bottom panels at both the wings had several loose and the main wing at the No. 2. The aileron with its tail was in position on both the extension wings. The extension wing outboard of the No. 22 with the aileron was found in one piece.

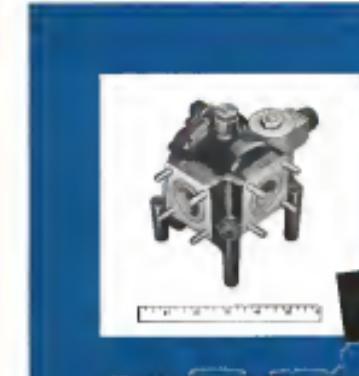
(6) Tailplane. The port stabilizer had suffered a large longitudinal crack in the skin right from the leading edge to the rear spar along its chord at a station close to No. 2 hinge location. The port stabilizer had been completely severed from the boom arm at the above station due to impact. There was no structural damage to the tailplane, but the skin was slightly wrinkled. The port rudder fulcrum had broken off its attachment at the trailing end of the front and rear spar panels. The aileron panel had again broken into two pieces along the span immediately between the two spars. The No. 3 hinge location was in good condition, but the No. 4 hinge location had sheared off at its roots. The stabilator/pilots had suffered impact damage in the vicinity of the raised leading edge. The two front and rear spars had failed near the root webs.

(7) Elevator. The port elevator had been cut into two pieces along its chord close to the No. 2 hinge location. The outboard elevator panel indicated a sharp collapse and had torn off its attachment to the operating control tube. The elevator skin showed bending fatigue at a chord location No. 3 and No. 4 hinge locations. It remained in a compression failure in the top flange and a tension failure at the bottom, that is, a down bend failure. The main balance sprong had been detached itself in a downward direction due to the main load.

The starboard elevator span had failed at bending fatigue in the main panel and was completely severed. The starboard elevator at this point was loose and a collapse of the spar seemed to have sheared off the main balance from its attachment to the elevator by ribs. The No. 3 hinge brackets on the starboard showed an outboard side load. The elevator had been cut into two at a point between the No. 2 and No. 4 hinge locations. The inboard portion of the elevator had been torn off its attachment to the longer tube.

There was no damage to the tailplane around the point where the elevator spar had failed in bending. The main panel of the starboard elevator was broken at a gear rib location and there was an evidence of impact damage to this section. The starboard skin panel had suffered diagonal wrinkles due to tension load on a stress line.

(8) Fin and rudder. The fin had broken off at spine point of the midsection just past the fin root. The top and bottom panels had been twisted in a clockwise direction and the bottom had been sheared off its mounting on the leading edge. The outboard hinge bracket was intact and the hinge bolt had sheared off on the post side. The top rudder skin location at the midsection had been twisted in a clockwise direction. The bottom had twisted lines of attachment to the leading edge. The lower fin and rudder had suffered extensive impact damage. The rudder operating control tube had impact



new
compact
lightweight

FUEL SHUT-OFF VALVE

OR 144 CONTROL OF FUEL FLOW IN TURBOJETS AND ROCKETS

Remote actuated control opens or closes this new Fuel Shut-Off Valve in one second. Actuated by pump pressure, it provides high flow rate with low pressure drop by use of a single poppet mounted in a flexible Teflon diaphragm. Specifically designed for turbine engine afterburner and rocket fuel feed systems, the valve is easily installed downstream from the pump. It has no close-clearing parts—handles unaffected fuel susceptible to the pump. Aromatic or aromatic fuels do not affect the parts, and most rocket fuels do not corrode them.

In operation, fuel oil pump generates energy in chamber above the valve diaphragm through a filtered inlet bleed port. Connecting the chamber to the downstream side of the diaphragm is an outlet bleed port which closes when a solenoid is de-energized. That fuel pressure in the chamber holds the valve in its

closed position. Energizing the solenoid reverses the action—holds the valve open. DC power source closes the valve—operation is bidirectional. If desired, an alternate configuration provides for opening the valve should power fail.

Integral legs permit mounting to the structure and allow adequate work area for attaching piping flanges.

SPECIFICATIONS: Type 144-10 Fuel Shut-Off Valve

FLOW RATE: 23,000 lb/hr. at 10 psi differential. Valve size may be scaled for larger or smaller flow rates, as required. PRESSURE: 650 psi maximum. OPERATING PRESSURE: 25 psi maximum. OPERATING: 1-second opening, 1-second closing. SHUT-OFF: 1/2 sec. PUMP: 1000 rpm. MEDIUM: Fuel oil & plus 200° F. POWER SOURCE: 12.5VDC. 1 engine maximum. MATERIAL: Housing: Aluminum alloy. Diaphragm and Seats: Teflon Valve Mounts and all other parts: stainless steel. CONNECTOR: 1/2" NPT male. PIPE CONNECTIONS: AN13000-30 fittings. DIMENSIONS: LENGTH: 10.5" Height: 4.0"; Width: 4.1" x 1.7"; Length: 5.1" x 3.1"; WEIGHT: 7.12 lbs.



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marks at several places.
At 1000 feet, the fuselage had failed at frame No. 26 close to the attachment station of the fuselage to the center wing. The fuselage panels indicated tension failure at the top and compression failure at the bottom. The fuselage panels of both sides had been detached from the main body were not broken. The rear fuselage had been affected by fire in the cabin position.

COMMUNICATIONS

The communications equipment carried on board the aircraft as well as the ground facilities were adequate for the flight under taken.

The aircraft contacted Dava Dava Approach Control on radio telephony frequency 1151 kc and obtained clearance to land at 1000 ft. The aircraft was cleared to change over to Dava Dava Approach Control frequency 1197 kc. The aircraft responded to Approach "Departing Dava Dava en route to Delhi."

The Approach Control gave clearance to climb over the top of the flight level in full share position 7,500 ft. The aircraft was also informed that a Dakota aircraft from Delhi crossing at 7,500 ft. was expected to arrive at Dava Dava at 1115 hr GMT. The Approach Control then passed QNH to the aircraft, but the acknowledgement of this was acknowledged by the aircraft. The communications were received from the aircraft on the frequency despite several calls which were independently made by the Approach Control when they did not receive the expected call from the aircraft which it should have sent on position 7,500 ft.

The Approach Control Officer contacted Approach Control and was informed that they were in contact with the aircraft. The Approach Control Officer, therefore, did not track any speed information to the best of the expected communication from the aircraft to Approach Control.

The Approach Control informed Area Control at 1101 hr GMT on radio telephony and reported: "Departed from Calcutta 1059 hr Estimated time of arrival Palan 1120 hr to Clodding to 12,000 ft." It was on the strength of this message that Area Control had informed the Approach Control that Approach Control had informed if they were in contact with the aircraft, that this was the last communication received by Area Control from the aircraft.

At 1109 hr GMT the Communications' radio operator at Calcutta, located on the radio station Delhi, Delhi, which had asked the aircraft to send an message, but there was no response from the aircraft. The radio operator at Calcutta then called the aircraft informing that that Delhi was ready to receive the message. Despite repeated calls therefrom, there was no response from the aircraft. At 1112 hr and 1119 hr GMT Area Control had attempted to retransmit messages regarding Palan and Gops weather to Communications for transmission to the aircraft. Communications attempted to pass these messages to the aircraft, but they were unable to make contact. The Communications' radio operator was very much at bay, thought that the aircraft might have independently suspended communication due to disorientation. However, this fact was not



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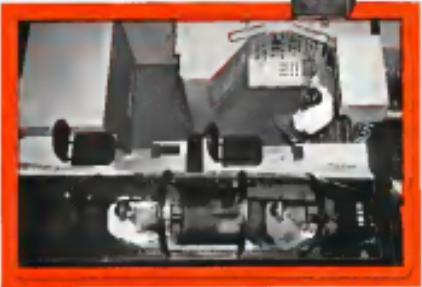


Bellows assemblies to check thermal expansion in pipe lines. Typical example—Syphon Practice Export line from the 1950's for water at hot water lines.



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Link between
ground and sky

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known by the Aeronautical Office, also proved that normal communications with the aircraft was being interrupted.

At 1135 hr. G.M.T. Delta informed a Calcutta Traffic Control who in communication with the aircraft, no Discrepancy report was held up at Palam. As a result of this Calcutta Area Control, the Aeronautical Office was informed that an message addressed to Calcutta had been received from the aircraft since the 1002 hr. G.M.T. It was then realized that all radio contact with the aircraft had already ceased.

SEARCH AND RESCUE ACTION

When it was known that communications with the aircraft had been lost, the Aeronautical Office sent signals to stations located in the neighborhood as well as to other Aeronautical and a general broadcast was also made on the assigned frequency. The aircraft was reported to be in the vicinity of Palam at 1002 hr. G.M.T. and at 1135 hr. G.M.T. the Bangalore R/T Operator was asked to read the message from Palam if the aircraft had landed there. At 1155 hr. the information was received that the aircraft had not landed, the distress signal was shown. Signals were passed by the Aeronautical and Indian Air Force stations to alert all police airports. Military Head quarters was also informed as well as the I.A.F. of Bangalore and the Chief Secretary, West Bengal, was also informed for passing information to all the districts. The Aeronautical Office, G.M.T. 1135, requested that the police and emergency officials in the areas between Gaya and Calcutta, Sambalpur report was made to the Aeronautical Office, Aeronautical.

All aircraft which were leaving Calcutta whether the Delta or Sambalpur were asked to keep a lookout for the aircraft and not land or stop for search, as it was considered that no useful purpose would be served at that time on account of weather conditions and darkness. Delta was asked and it confirmed that search office was being taken from the site also.

One of the first to arrive at the village Dargai and the Sub-inspector of Police, Jajpuria Police Station, was supposed as he is a neighboring village for some investigation. He immediately went to the scene of the crash and found two men lying on the ground. He sent a messenger to the Police Station. It being a third-class Police Station, the only means of immediate communication was the railway Telegraph Office. But the Station Master, who was asked to send a wire, found that the through switch from Jajpuria to Howrah Main was defective and that he could not get through. So he tried to send the message by hand wire from station to station. He has given the details of the steps taken by him, and no message was in fact received at the Dhan Dhan Airport till next morning.

Emergency steps were taken by the Police in the direction of the site. One of the first policemen was sent. On the morning of Feb. 10, 1953 a BOMC York as well as two Indian Air Force assault commandos searching and information was received at Dhan Dhan Airport from the Police Headquarters, Lalgola, Calcutta. The two aeroplanes seemed to have crashed in the air and that the police officer had gone to the spot for

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investigation. As soon as the message was received, Army Control informed the search aircraft to proceed to the position reported for the downed A-37. A search was made in the Aerop. Health Center, the first aid recipient and BOMC operator staff, proceeded to the BOMC City office where it was confirmed that the position of crash gear by the police was correct and that the wreckage was that of the Convair. The last plane had been positioned to the site of the accident.

Out of the 41 persons on board the aircraft only 46 bodies were recovered, and the remaining three must have been destroyed in the fire.

DISCUSSION OF THE EVIDENCE

The ill-fated jet aircraft Convair, G-ALEV, reported a scheduled service from London to Singapore. On return flight from Singapore on 2nd May 1953, it landed at Kuala Lumpur Airport at 0400 hr. GMT (0118 hr. BST).

At the airport the normal procedure was carried out as directed by Mr. Jones, the Station Station Officer, BOMC at Kuala Lumpur, who was in charge of the normal operations of all airport buildings and installations as well as the maintenance of the aircraft.

Investigation revealed that the aircraft held a valid Certificate of Airworthiness and a valid Certificate of Maintenance. At the time of takeoff, its takeoff weight was below the calculated weight for departure from London, about 1000 lb. and the takeoff weight was within the safe limits. The aircraft was an experienced pilot with adequate experience in Convair aircraft. He had also considerable flying experience of the route. Other members of the operating crew of the aircraft had the requisite qualifications and experience. They held valid licences.

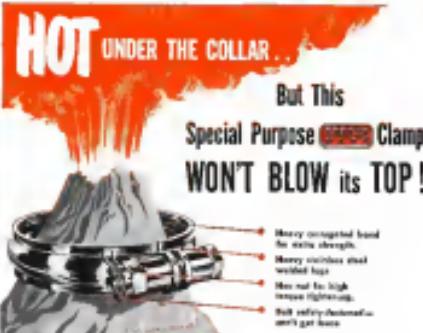
The Captain was also provided with a distance certificate which was duly signed by him. Before landing, he was informed of the expected status of the approach area 3100 hr. GMT (1800 hr. BST). After landing, he was informed of the weather forecast that the storm was reported between 2100 and 2400 hr. GMT (1730 and 2130 hr. BST).

A warning of the expected storm was also issued by the Army Control Officer, which was received by Mr. Wheeler, the Station Officer of the BOMC and passed on to the Captain of the Convair. It was also reported that a thunderstorm accompanied by squalls from the northeast with speed reaching 50 knots was reported over Kuala Lumpur and approached between 2100 hr. and 2400 hr. GMT (1730 hr. and 2130 hr. BST). Both of them then went to the control room and after talking to the Captain, left in his car with the Officer on duty, Mr. Clark, around. It seems that the Captain was more anxious to ascertain the weather at the terminal (like Kuala Lumpur) where he was to land than about the en route weather.

The weather conditions at Kuala Lumpur has been described in a BOMC Manual as follows:

"Subject to the ILS and the associated factors being serviceable, the initial conditions for Delta-Delta on runway 19 (which was the runway that the aircraft had used in clear blue 500 feet and visibility 1600 yards).

The actual conditions at Delta-Delta at



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* Overcontrolling as lot of control by the pilot when flying through the shoulder storm.

RECOMMENDATIONS

The Coast recommends:
* That the weatherman should be transported to the missile site in the State of Oregon and an detailed technical examination be undertaken with a view to determine the primary failure and to consider if any modification in the structure of the Coast aircraft is necessary.

* The Coast recommendation should be given to the Director of Flying of the Flying Control System of the Coast aircraft in order to give the pilot a positive "feel" of altitude gained on the control surfaces.

*J. N. S. LOKUR, Coast
D. M. RAJA, Assistant
D. N. Srinivasan, Assistant
J. T. NELSON, Assistant
Colombo Airport,
Colombo, Ceylon*

28th May 1958

APPENDIX VII

POSSIBLE CAUSE OF STRUCTURAL FAILURE

As disclosed by Shek W. Srinivasan,
(Assistant)

A technical examination of the wreckage has revealed several significant factors that indicate a structural failure during flight in stormy weather conditions. This is a rather queer occurrence that has spread from the wing root on to the main body of the aircraft. A study of the different components that have been failure shows many primary cause of the elevation angle is leading due to a lower down load imposed on a "pulley" by the pilot when the aircraft commenced a roll down down pull during an flight across a "screaming squall".

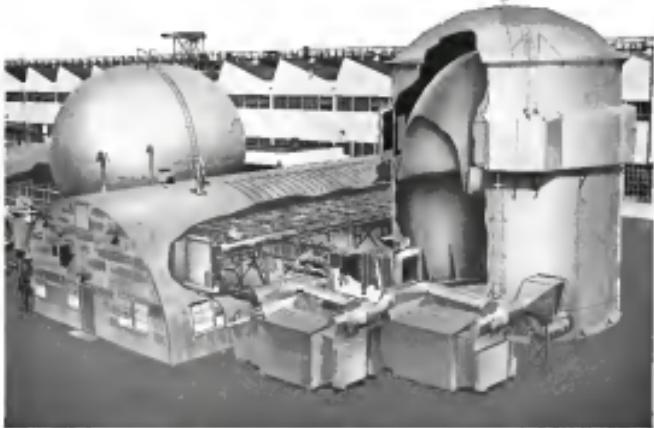
Weather Data

The Coast during its flights about 6 minutes after takeoff met stormy weather conditions. The "screaming squall" according to meteorological experts, consists of a horizontal wind that has an intensity of "moderate" strength and is moving between 10 and 40 miles per hour. The experts say that aircraft cannot fly in squall as it strikes towards the cloud base. The squall may even exceed 40 miles per hour at different stages of formation. When the aircraft is flying through the squall, the "motor" stage starts with a down pull of roll and consequent down-pull of velocity varying between 15 and 30 miles per hour.

Delicate data on the gear velocities during its three flights are available, so examination of the Colombo report shows that the speeds of the various components of the aircraft were obtained even with the use of the most accurate instruments. However, up and down pull varying in intensity from 15 to 30 miles per hour at different altitudes may possibly induce the stormy weather conditions. On evidence by report, the aircraft was flying through the squall at the best way to fly through a storm or squall is to cut across it 90° with normal controls (i.e. without autopilot). While flying through a shoulder storm, the Captain failed over the controls and tried to maintain the altitude of the aircraft at the same. The re-

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been on the plane. The metal cluster does not have a shroud box to take the tensile loads. The triangular metal box off the main beam is for the main torsion rod, which is a structural member. The box will be rotated by the skin panels in tension field. There are indications on the tailboom cluster to show that it has suffered a down load and presented a diagonal crack. The span is between No. 3 and No. 4 longer upper to lower going way in length. The span is going with the aircraft because of the longitudinal bending induced due to the tensile field case points on the skin panels.

The elevators may have been stressed in the following and counteracting loads as mentioned during flight in ground tests. A static test may also have been carried out to test the skin panels in tension field as a down or up load occurs in view of the absence of a shear wave system. In the absence of design details, it has not been possible to be definite on the comparative structural strength of the major components.

It may be possible to plot the trajectory of the lifting bodies and predict with a certain amount of accuracy the primary failure of the aircraft. Since the aircraft disintegrated into several pieces up in the air with some assessment of the load conditions between parts and due to the fact that discrete data on the strip when this at the time of wreckage is not possible, an attempt was made to draw the trajectories and predict the primary failure.

It is understood during the investigation that the wing was stepped in a stepped and by the time of the first disintegration the third largest step of the aircraft. One can test prove static and fatigue tests were conducted already. The wing failed in fatigue test and static modification was reflected in a static test. The wing failed again at 90% of the static load. The aircraft was referred to the fatigue load multiplied by five. Modifications were carried out again and, with a safety, it was found satisfactory for the ultimate load as determined on calculations. The fatigue failure damage must not exceed at Lib No. 7 where the cumulative damage from the steps prior to an aircraft shell construction.

In this respect, again the wings have significantly failed at Lib. 7. Whatever the load may be the failure in Lib 7 may indicate the lack of proper definition of the safe load on the aircraft at Lib. 7. In the absence of design data no definite statements can be made on the wing failure, but a further investigation on the steps involved at Lib 7 will help.

It is extremely difficult during this short period of investigation to determine both load and damage to substantiate the primary failure with off details, but there are strong indications on the wreckage to suggest the primary failure of the elevator during a "pullout". The Comet has got an elevator control system operated with hydraulics power with no feedback measurement for pitch roll. It is quite possible that the elevator system is involved in a sort of "lockup" as the aircraft design moment had exceeded the aircraft beyond the limit that would separate the design loads on the aircraft. In this respect any modification to incorporate a control "lockout" in the elevator system will be a definite improvement.



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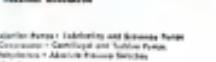
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• **Eastern Route**—These routes make possible of Capital are affected by the new Northwest route, in which the mainline route is a competitor from the northwest to the cities of the Northwest. Through these alternative routes, as during Cap's to the Oklahoma and

Texas route. Question is whether the Board will consolidate Capital's inter-
state route system.

Because of route completeness of
certain route systems at the three
last route cases, Washington observers
expect hearings to be delayed to fall and
ultimately decision to next year.

For American and it should have the
right to jump from its Alaska base to
Japan, since the U.S. customer is el-
igible to travel to the Orient anyway and
PanAm should have the privilege of
being in the shortest, cheapest route
without adding any new connection.

TWA add that since it already had
right to China, the easiest adjustment
would be to substitute Japan, since
Companys took over China several
years ago.

Nonskied Wins Delay Of CAB Hearings

Federal District Court in Washington
last week granted Pan American
Airways a stay of Civil Aeronautics
Board enforcement hearings aimed at
halting the large Seattle carrier's
right to fly to the Orient.

TWA, Northwest, and Pan American
had filed suit against the CAB, charging

that the agency's action was a
unlawful exercise of its authority to
halt the three carriers' right to fly to
the Orient. The suit was filed in the U.S. District Court in Seattle.

The American vice president, Alvin
Adams, charged that CAB restrictions
on Pan's route had "no other route
than to Inland Northwest Airlines," at a
cost of millions of dollars to the
airline.

He said TWA and Northwest would
not cover the route.

• **Major Cities**—To further their case,
the carriers made these claims:

• **Cost.** Northwest and its cost per

passenger in the Pacific is 20 cents, com-
pared to Pan American's 30 cents. Pan
American denied this and added that
the CAB restrictions forcing it to fly
1,000 mi. further to get to the new
route (Supra) accounts for some cost
differential, and several 100-mile-
way points in the Pacific and Amer-
ican lines cost even more.

• **Alaska.** TWA and Northwest said
to propose lowest trans-Pacific air
fares. Pan American proposed
a route from the Orient last year
but was turned down by CAB.

• **Equipment.** Northwest said it would
give the first nonstop American-Japan
service when it gets Wright Turbo
Compound-powered Super Constellations.
Pan American said it would use
such and four-class Stratocruisers, as it
did in nonstop, scheduled West
Coast/Hawaii coach service, and would
use DC-8s for fast-class and combine
such and nonstop flights.

• **Routes.** Northwest and Pan Ameri-
can's South and Central Pacific routes
run Honolulu after a cyclical route
advantage because of the carrier's choice
of route enroute stops. Also, TWA said,
airlines from their charter
will skip from Northwest's chilly
Arctic route.

For American and it should have the
right to jump from its Alaska base to
Japan, since the U.S. customer is el-
igible to travel to the Orient anyway and
PanAm should have the privilege of
being in the shortest, cheapest route
without adding any new connection.

TWA add that since it already had
right to China, the easiest adjustment
would be to substitute Japan, since
Companys took over China several
years ago.

The problem that the planned changes
in DC-8 parts and equipment will make
it "safer than any Interjet but the
DC-8."

Operators Back C-46 Safety Plan

Consultant says program exceeds CAB requirements,
although it fails to meet technical specifications.

A multi-million-dollar C-46 safety
program put by Ben Howard, test
pilot and safety consultant, has been
unanimously supported by commercial
operators of the 150 C-46s now in
use since 1946 to date. Most
compliance with the regulation through
addition power would come without
any change, they argue.

The foundation was set up by C-46
operators to take the initial place of
the plane manufacturer in guiding im-
proved engineering and operation of
the aircraft. This is necessary for the
C-46 because its original manufacturer,
Consolidated Corp., abandoned the
aircraft.

• **Existing Programs.**—The program will
put most the technical requirements of
the Civil Aviation Board's certification
regulations. CAB has outlined compliance
with the Civil Air Regulations by
the end of this year, but Howard says
the new program will make the plane
safer than the CAB requires.

He points that the planned changes
in DC-8 parts and equipment will make
it "safer than any Interjet but the
DC-8."

The C-46 group claims that if Civil

Aeronautics Administration and CAB
approve the new alternative program
presented, they will find that it will
eliminate or minimize the commercial
operator's need to replace the engine with
a more powerful C-46 at this time.
Capital cost of that would prevent
most of the other mechanical and
operational improvements, they say,
and the result would be less safety

but inspection capacity also may be re-
duced.

• **Reliability.** Reliability will be improved
by the above improvements—including
cooler temperatures and less heat loss
from the exhaust system. However,
and the operators are determined not to
replace the engine with a more
powerful C-46 at this time.

C-46 operators say the cost of that
would prevent most of the other mechanical and
operational improvements. They say,
and the result would be less safety

but inspection capacity will be improved through installation of a thicker steel
flange between power and accessory
sections and addition of new flaps.

• **Ground ventilation.**—Ground ventilation
after shutdown will be improved by an
automatic cooling system that closes
the engine cowling.

• **Interjet.**—In the program, the
C-46 operators who belong to the
line transport organizations—Air Transport
Assn., Transport Air Corp., Inter-
dependent Military Air Transport
Assn. and Air Coach Transport Assn.

• **Safety Plus.**—In this program

• **Reliabilti**



DOUGLAS DC-7 DONS AA INSIGNIA

First view of Douglas DC-7 shows Wright Turbo Compound-engine transport wearing the markings of American—which will be the first carrier to receive the new aircraft. This is the third DC-7 of Douglas' San Monica production line. The first two are being used for flight and certification tests. The fourth will receive progressive modifications intended to make American Airline

airline DC-7 in the fall and expects to put
the plane into service the end of November.
Some modifications are expected to make the
DC-7 working on the vertical fin more
resistant to gusts of wind. The first two are being
used for flight and certification tests. The
fourth will receive progressive modifications
intended to make American Airline



AUGUST 17, 1953

AVIATION WEEK

THE USAF "AIR RESEARCH AND DEVELOPMENT COMMAND" EDITION

Including a Special Report on "AVIONICS IN THE AIR FORCE"

On Aug. 12-13, 1953, in Wright-Patterson Air Force Base, Ohio, the Air Research and Development Command will publish the story of ARDC. News Center of Research and Development, included in this issue will be a full-scale Special Report titled, "Avionics in the Air Force." This feature, approved 100% preflight by a cooperation committee of the ARDC and the aircraft industry, offers avionics-oriented editorial value, thus presenting Aviation Manufacturers and Suppliers with an outstanding opportunity to advertise

their products and services to the industry. Aviation Week Editors working in Washington compiled a running story of Research and Development in the Air Force, a moving, powerful picture of the organization and mission of the six major Centers within the ARDC. In addition, this Aviation Week Edition will set new standards of editorial presentation and dwarf in size all other publishing assignments of that nature.

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by manufacturers to service owners with all the latest information on engineering, maintenance and operation of the type plane. Foundation will

1. Keep operators up to date on engineering changes and "fixes."

2. Keep manufacturers standards of plane engineering strong. C-46

3. Act as central office for C-46 information.

4. Cache and finance C-46 programs for travel safety. Individual members are invited to the summer of any such group undertakings.

■ **Finally** Safe-Howard and some CAB officials maintain that the C-46 design basically is sound and safe. Its simplicity is a major safety merit, as with the DC-4. The transport has a low wing-loading ratio, which is emphasized by the power-load ratio, under the plane comparable to other types in current production. Howard says:

"In going to the CAB, the CAB can't make up all the C-46 accidents and says none could be attributed directly to overloaded or underpowered condition. Redefining payload would not make the C-46 safe; the new industry program will, Howard concludes.

MATS Reports Civil Korean Airlift Loads

In the latest roundup of the role of commercial aviation in the Korean conflict, Military Air Transport Service representatives that the Pan American World Airways and Pan Am sub-subsidiaries—Pan Am, Pan American Eastern, Pan American National and Panair—made 2,153 flights overseas from June 30, 1950, to June 1, 1951.

The Pan Am total flew 12,160,029 aircraft miles during a total of 182,969 flight hours, from 62,725,158 passenger ton-miles, 24,754,062 mail ton-miles, 61,628,795 cargo ton-miles. Number of

passenger flown totaled 185,473, 7,962,972 lbs. of mail and 23,555,827 lbs. of cargo were hauled.

One of the highlights of the overall Pan Am subcontract effort was moving the Hot Nights-Korean Wing, including spare engines, spare parts, tools and aircraft from Albany, Ga., to Seoul, Far East. The operation, which took three months, when the C-46 was returned to this country and was replaced by the 27th Wing here.

Transamerica Air Lines, another major Korean airline operator, reports that during the 42 months since the war began it has flown 191,749,356 passenger miles, 65,675,917 ton-miles, and 14,598,561 passengers in 76,341 flight hours.

These figures cover Transair's Tokyo flights. Using DC-4s that average 392 mph on the run, TAL has been obtaining 12-hr. plane turnaround times.

Wiggins Loses Air Carrier Certificate

Wiggins Airways may lose its subsidy and disappear from the scheduled airline business Aug. 1, following Civil Aviation Board decision not to renew the air carrier's certificate.

New CAB member Horace Denby breaks the former Board split on the issue and tipped the scales against Wiggo in the 3-to-2 decision, supporting the previous ruling of Oswald Ryan and George Glancy. The majority felt that subsidy paid to the airline was not and should remain too high per seat of revenue and that other seat carriers could fill the gap cheaper.

■ **Feeding Up the Pilots**—Northeast and Midwest Airlines will split up power of Wiggo's New England-New York system. NELA gets Philadelphia, Mass., and Wisconsin; Midwest, R. J.

systems and a one-year authorization to serve Roanoke, Va.

Mohawk will take over the Albany, N. Y. routes now on Pittsfield, Springfield and Worcester.

Although Wiggo's subsidy per passenger was highest in the local airline industry, its total subsidy was the lowest.

The airline had been maintaining average with high-speeds instead of the DC-3, which is much more expensive per plane-mile; less hours and cost per passenger-mile with a load.

The Board rejected Wiggo's proposal to switch its routes and switch to DC-3s. CAB and New England apparently does not regard this much additional air service, and the DC-3 would increase subsidy need of Wiggo.

■ **Local DC-3s**—The Board decision acknowledging Wiggo's high-speeds and high subsidies to Albany, N. Y., Pittsfield, Worcester, Mass., and Boston (see *Airline Week* Mar. 25, p. 75) confirms the local airlines to DC-3s almost exclusively for the foreseeable future.

Although local airlines have found that the DC-3 gives the lowest unit costs on local routes, they say it can serve few without subsidy. Local airline staffers are getting approximately \$30 million of subsidy per year from the Board.

CAB ORDERS

(June 24/July 3)

APPROVALS

Airline, Columbus airline, received its second Air Transport Act renewal by the Civil Aviation Board, effective July 1. The first came in January.

■ **Flying Up the Pilots**—Northeast and Midwest Airlines will split up power of Wiggo's New England-New York system. NELA gets Philadelphia, Mass., and Wisconsin; Midwest, R. J.

Southwest Airlines was granted permission to make 10 of 12 Europe-New York airways flights on behalf of later governmental Committee for European Migration. Trans World Airlines submitted bids on two of the 12 flights.

■ **International Airlines**—Pan American, Pan American Flight and Pacific Northwest Corp. were approved. Similar approval was granted to Cuban Cities Corp. and Cuban Air Transport Corp.

Trans World Airlines was authorized to serve Liverpool-Kingsgate-Gloucester, Tin Mine, Tyne and Loftus and to direct Loftus-Holmes on segment 5 flights serving Liverpool, et al.

International Air Transport Corp. received its airways agency order on behalf of agency less approved.

West Coast Airlines was granted to start serving Klamath Falls, Ore. The route will make stops near Eads, Minnesota to Aug. 1.

International agreements of TWA, Air France, et al, were approved.

Transocean Air Lines' Oakland-Tokyo flights for national shipping authority were approved. However, centralized services did not fit in accordance with specifications of the commission.

Central Airlines gained permission to fly Bell Telephone telephone techniques for six months while serving as airborne equipment observers.

Arthur A. Scott's contract renewal with Defense Department, allowing a 10% increase in military personnel travel at government expense, was granted by CAB. Major Air Lines, Inc., also obtained permission grants that this was discriminatory at least at one government agency.

Midway Air Transport Corp. was granted to recognize its corporation.

Western Air Freight Forwarder president Ernest Morris' rechartering application at general airport for a motor shipper's license was approved.

■ **DENIED, DISMISSED**

Northeast Airlines' renewal permission to expand service to Kalgan, Man., on Route 3.

■ **Atlantic Transport**—Airline, petition for international route to its license was dismissed, because ACTA did not follow it up.

Central Pacific Airlines application in the trans-Pacific route east was dismissed at the company's request.

Southwest Airlines' petition for permission to serve Klamath Falls, Ore. was denied.

CEASE AND DESIST

BellSouth Airlines was ordered to stop paying for some professional services with free airline tickets. Relief was granted.

■ **Flying High Line**—Westair was granted to expand its service to 10 states in accordance with CAB's condition. CAB approved the airline's last proposed Airway was the much as carrier to give such an exemption. "The present tendency would, if continued, result in giving the exemption to a route for which it is not justified," CAB said.

■ **Southwest Airlines**—Southwest Airlines was granted permission to make 10 of 12 Europe-New York airways flights on behalf of later governmental Committee for European Migration. Trans World Airlines submitted bids on two of the 12 flights.

■ **North American Airlines**—Petition for dismissal of enforcement proceeding was denied by the Board, which alleged that some evidence in the case indicates violations not only of CAB regulations but also of the Civil Aeronautics Act.

■ **American Airlines**—Application to move Niagara Falls, N. Y., through use of Buffalo Municipal Airport was rejected for public hearing.

■ **Universal Air Freight Corp.**—Application for a letter of registration will be forwarded to the Board if the company's rail and truck affiliations are presented by the Civil Aeronautics Act.

■ **Western Airlines**—Request for permission to expand service to Spokane, B. D., or serve it via the Rapid City Airport will be investigated.

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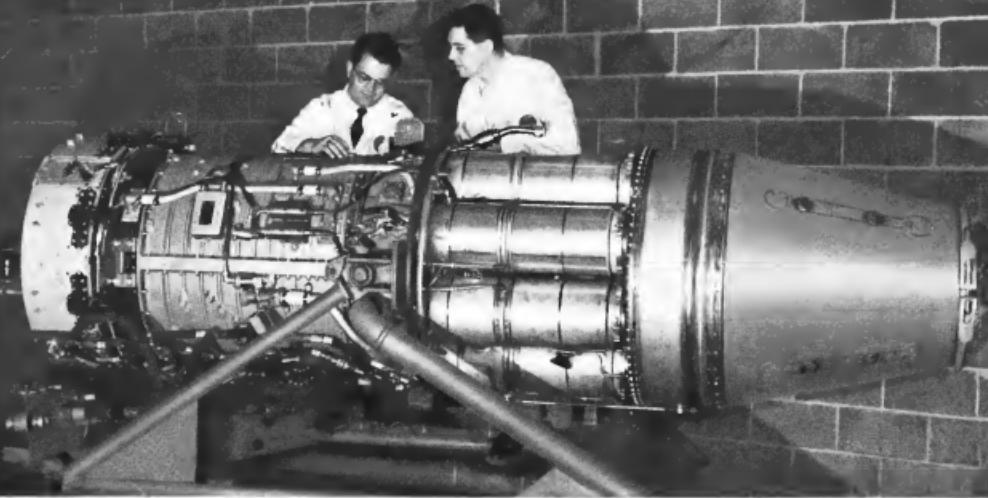
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Directing some of its best engineering efforts at making a good engine even better, General Electric has succeeded in doubling the life expectancy between overhauls of the J47-25 engine, powerplant of the famous Boeing B-47 Stratojet.

This extended life is the direct result of a continuing program at General Electric to improve the performance of production engines while designing more powerful, lighter-weight, more efficient engines for the future. Does it pay off? G-E engine improvements, coupled with the Air Force's quality control and field maintenance program, will save U.S. taxpayers \$100,000,000 a year on the -25 engine alone!

Actually General Electric's engine improvement and development program has resulted in over 3000 improvements in the J47 engine—ranging in scope from a minor change in fasteners to a major change in combustion chambers.

But engine improvements alone are not enough at G.E. First and largest manufacturer of jet engines in the U.S., General Electric is also continually improving manufacturing processes. Vertical assembly is a good

example: it saves space, speeds assembly, assures optimum alignment of engine parts.

Such improvements are the basis for the statement, "Progress is our most important product." Section 230-18, General Electric Company, Schenectady 5, N.Y.



POWERED BY SIX G-E J47-25 engines, the Boeing B-47 Stratojet can now fly twice as many hours between engine overhauls . . . a direct result of G.E.'s engine improvement and development program and the USAF's quality control and field maintenance program.

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